

U. S. DEPARTMENT OF AGRICULTURE.

REPORT

OF

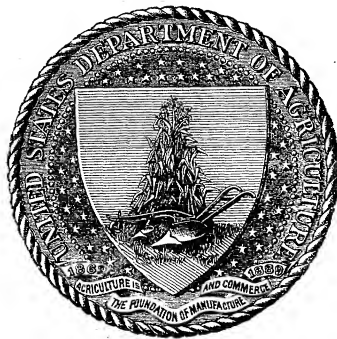
THE POMOLOGIST

FOR

1894.

BY

SAMUEL B. HEIGES.



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LETTER OF TRANSMITTAL.

UNITED STATES DEPARTMENT OF AGRICULTURE,
DIVISION OF POMOLOGY,
Washington, D. C., July 15, 1895.

SIR: I have the honor to transmit herewith a report of certain operations of this division during the year 1894, comprising matter which could not appropriately be included in my special business report already made and published as a part of the executive report of the United States Department of Agriculture for the fiscal year 1894. I have appended brief articles on miscellaneous subjects; a paper on Nut Culture, by H. M. Engle; a paper on Prune Culture in the Pacific Northwest, by E. R. Lake; and a paper on Notes on Peach Culture, by J. H. Hale. The publication of this information in bulletin form is desirable for distribution to the regular correspondents of the division and to satisfy inquirers for information on various pomological subjects.

Very respectfully,

S. B. HEIGES,
Pomologist.

Hon. J. STERLING MORTON,
Secretary of Agriculture.

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REPORT OF THE POMOLOGIST FOR 1894.

WORK OF THE YEAR.

The Pomologist made two excursions during the year into fruit growing sections of the States, and the following notes record some of his observations. Prior to these excursions he attended the meeting of the Pennsylvania State Horticultural Society at Harrisburg, in January, 1894, at which there was an unusually large attendance of the members of the society, and the papers and addresses were of an eminently practical character, but the display of fruit was not as fine as might have been expected from a State that has originated so many fine and popular varieties of apples.

FROM THE POMOLOGIST'S NOTES.

Western trip.—During September the meeting of the Michigan Horticultural Society at South Haven was attended by the chief of this division. The meeting was held in a grove, and was remarkably well attended, not only by the members, but also by farmers and others not members of the society. Papers and addresses of a very practical character were presented, each being followed by an animated and instructive discussion; but the matter which elicited the most attention was the demand for a more rigid enforcement of the "peach yellows law."

The inference from the discussion was that the law is inefficient in its means of enforcement; but upon visiting their most noted fruit sections it was an agreeable surprise to find but one tree marked by the supervisors that had not been removed, and upon inquiry it was found that the time allotted for its removal had not expired. The real reason, however, was the demand made on the force by the work of marketing the peach crop. In the many orchards visited only one tree was seen with symptoms of yellows that had escaped the supervisors' notice.

During this period of inspection all kinds of culture, from the most thorough to the most slovenly, were observed. This was especially true of the pear orchards, a few of which appeared to be dying from sheer neglect. Thorough culture had proved profitable in every instance, the extensive plum and pear orchards around South Haven, which were in a fine state of culture, being heavily laden with fruit. Gooseberries and currants are also extensively grown. At South Haven the

14 acres of tree fruits, grapes, and berries belonging to the Michigan Agricultural College, and under the supervision of T. T. Lyon, were in excellent condition. At this place all the varieties of fruits supposed to be adapted to the State of Michigan are being tested. These varieties are properly labeled and an accurate record is kept of the behavior of each.

One day was spent at the agricultural college at Lansing, Mich., and by the kindness of Professor Taft an opportunity was afforded for inspecting the farm and orchards of the institution. These orchards were in excellent condition and gave evidence of intelligent pruning and culture.

The pear orchard of Charles S. Mills, near South Haven, was the finest that ever came under the observation of the writer. The trees were about 8 years old, mostly Angouleme (Duchess), and in 1893 the entire crop averaged \$5 per barrel in Chicago; in 1894 the crop was simply enormous.

In very few orchards visited had any attempt been made at thinning the fruit upon the trees. Almost every tree was permitted to carry all the fruit that "set." On this account the peaches especially were under size. Much of the want of vigor in the trees was the result of "overproduction." Considering that the most critical period in the life of a tree is fructification, the importance of not permitting a tree to overdo itself is plain. Experiments conducted for upward of twenty years have resulted in a conviction that by careful and judicious thinning of the fruit peach trees ought, barring frost, to produce a profitable crop every year. The same, no doubt, is true of all other varieties of fruits.

Southern trip.—During the month of November, on the way to Jackson, Tenn., to attend a meeting of the Western Tennessee Farmers' Association, held under the auspices of the Hon. T. F. B. Allison, commissioner of agriculture, a tour was made by the pomologist through Virginia, North Carolina, South Carolina, Georgia, and Tennessee.

The first point of observation was the extensive orchards and nurseries of J. Van Lindley at Pomona, near Greensboro, N. C. Here are several hundred acres devoted to propagating trees of all varieties adapted to the South, and extensive orchards consisting of many varieties of choice fruits.

The peach orchards were entirely exempt from the yellows; no indication of any type of the disease could be found, and Mr. Van Lindley said that the disease was unknown in that region. His pear trees in the nursery rows, grown upon stock raised from imported Japan seed, could not well be surpassed. The following varieties do remarkably well upon Japan stock: Bartlett, Buffum, Clapp Favorite, Vermont Beauty, Prince St. Germain, Easter, Anjou, and all of this class. Giffard and Seckel do not succeed so well, nor any poor grower of this class, but they do as well on the Japan as on the French stock, while

all the oriental varieties, such as Kieffer, Le Conte, Garber, etc., are at home on the Japan stock.

It is proper to state in this connection that this stock does not appear to do so well in the North, in New York especially.

Cherries do remarkably well at Pomona. The finer heart varieties, however, are subject to cracking of the bark upon the southwest exposure, "three o'clock sun scald," injuring the appearance and affecting the hardiness of the tree.

In the extensive orchards of Mr. George C. Boggs, near Waynesville, N. C., there are 70 acres in apples, the trees being in a flourishing condition. Ralls Genet, Rome (Beauty), and Grimes are found very valuable owing to their late blooming proclivities. Mr. Boggs has planted largely of Newtown Pippin, which is grown of superior quality here. The York Imperial is also extensively planted here and in the adjoining Goodrich orchard of 75 acres. Near Waynesville the Smathers & Satterthwaite Company has extensive vineyards and orchards, the apples being principally fall and winter varieties.

At Turnpike, Colonel Hoyt has a vineyard of 10 acres, the fruit of which is principally converted into wine. Here also Mr. J. C. Smathers has a fine apple orchard of about 10 acres. The principal varieties are Buff, Newtown, Green Pippin, Winesap, Ben Davis, and Hoover. His vineyard of 50 acres consists principally of Niagara.

Dr. Welsh has an apple orchard of about 20 acres in bearing near Waynesville. There are several other smaller orchards at the foot of the Balsam Mountains. This section of North Carolina is remarkably well adapted to the growing of fine apples.

At Tryon, N. C., is a colony of enthusiastic fruit growers. Grape culture is their specialty, and peach growing is next of importance. The Niagara grapes of Tryon are considered the finest grown in any section. Messrs. Whitney, Hadley, Garrison, and Coxe are the most extensive peach growers. Their principal varieties are the Crawfords, Elberta, Oldmixon, St. John, Amsden, Rivers, Heath Cling, and Stump. The principal grape growers are Messrs. Thomas, Johnson, Doubleday & Lanier, Whitney, Hadley, Godshaw, Luckey, Morton, Stearnes, and Lemort & Golay. Their vineyards range from 3,000 to 8,000 vines. Lemort & Golay propose to plant 30,000 vines for the purpose of manufacturing wine. The members of this firm have been reared in wine-making districts of southern Europe.

Owing to freedom from frost, absence of fogs, and length of season, many varieties of grapes usually grown under glass would no doubt mature here in the open air, a new branch of the grape industry be established, and the country at large benefited by the production of exotic grapes at a lower cost than they can be grown under glass. With the mildew entirely under control by judicious and frequent spraying, the production of the finer varieties of grapes should be assured in a few years. To test this Dr. Kenworthy has promised to

take charge of vines that were forwarded at the request of the Pomologist from the California Experiment Station and from the grape house of the Department of Agriculture.

The principal growers of grapes in the neighborhood of Greenville, S. C., are Messrs. Buist, Rossler, Beattie, Jeffereaux, Howell, Helmes, Markley, and Finlay & Garoux. None of their vineyards are large, averaging about 2,000 vines. The varieties principally grown are Concord, Delaware, Niagara, and Ives.

From casual observation en route to Knoxville the inference is drawn that fruit might be grown profitably in portions of Georgia now possessed of railroad facilities in which but few trees are grown at present.

At Knoxville, under the guidance of Prof. R. L. Watts, horticulturist of the Tennessee Agricultural College, all the departments of that institution were visited, and the equipments for agricultural and mechanical work were found to be of an excellent character.

A visit was made to the vineyard and fruit farm of Mr. William Jenkins, where he grows the Lutie grape extensively. Although the prospects of a crop that year were destroyed by frost, this variety, more than any other, set fruit upon the two-year-old wood.¹ The observations of one day spent on Missionary Ridge, near Chattanooga, showed that grapes, peaches, apples, and pears might be grown here most successfully. John E. MacGowan and Timsan Tradesman are the principal growers on Missionary Ridge.

Charles E. Stanley, on Orchard Knob, is one of the pioneer growers of grapes and peaches. Adam Steverin makes a specialty of the Niles grape.

The meeting at Jackson, Tenn., was made very profitable by the thorough and full discussion of the subjects arranged by the commissioner of agriculture, and more interest was manifested in the discussion of horticultural subjects than those of a purely agricultural character.

¹The general injury to the grapevine by the great freeze of the year brought about a more careful observation of the vine than had been given it before. From various parties we learned that clusters of grapes had formed on shoots grown from wood more than one year old. A. Du Breuil, professor of horticulture and arboriculture in the Royal School of Arts and Trades, in his comprehensive work on Vineyard Culture, pages 149 and 150, discussing the operation of pruning, states that (1) the shoots alone produce blossoms on the vine; (2) the shoots growing out of the stems from the preceding year are the only ones which produce grapes, the shoots growing from the old wood, as sometimes happens, being invariably barren.

J. D. Patton, of Cleveland, Tenn., wrote early in the season that his vines were forming clusters on wood more than one year old, and on December 13 sent to this Division a section of a vine at least three years old upon which grapes had matured on shoots grown thereon.

Careful observations made by every member of the Division of Pomology led to the discovery of clusters of grapes on the Ives and Haskell grown on the grounds of the Department of Agriculture upon wood two and three years old.

From Nashville to the Tennessee River is a very valuable section for chestnut culture. Beyond the Tennessee much of the country, as far as Jackson, is low and not adapted to fruit culture.

Bedford City, Va., was visited on the return trip. This section is well adapted to general fruit culture. Many varieties of choice apples only locally known are cultivated. Choice black walnuts abound, and two pecan trees, each 3 feet in diameter, are to be found in this county. Among their local apples, that should be better known, said to be of first-class quality, are Big Hill (Pryor and Nickajack), Cofer, Fine Winter, Nansemond, Beauty, Red Apple, Mitchell, White Sweeting, Foster, Green Flat, and Jackson.

At Charlottesville many of the vineyards of that noted section were observed. William Kopoff has 75 acres in vineyards, in which grow Norton, Ives, Concord, Riesling, and Elvira. He sprays very early and his vineyards are not troubled with rot; he formerly sprayed five times, but now sprays only twice a season. He fertilizes with raw bone, as potash does not do as well, and none who have tried it see benefit from its use. His vineyard has yielded 8,000 pounds per acre. He converts his grapes into wine and makes from 20,000 to 60,000 gallons per year, which he sells to private parties from Maine to Texas. He also distills about 400 gallons of brandy per annum.

Mr. Becket has 100 acres largely devoted to grapes. His Delawares bring him 35 to 85 cents and Concords 30 to 60 cents per 5-pound basket; Salems 45 cents and Marthas 35 to 60 cents per 4-pound basket.

The Monticello Wine Company, largely engaged in the making of wines and the distillation of brandy, affords a convenient market for the grapes of this region. The resources of this section in general fruit culture are varied and of great extent.

On Thursday, November 29, 1894, a meeting of quite a number of the most progressive growers of this section was held, from which not the least important result was the reorganization of the horticultural society of the county.

There is no doubt that great good will result from visits like these to various sections of the country, as the Department will be made more familiar with the development, wants, and progress of various sections and be brought into closer touch with the most progressive minds of each section.

SEEDS, PLANTS, AND SCIONS RECEIVED AND DISTRIBUTED.

During the year plants, vines, seeds, and scions were sent to 181 different persons. The distribution of these was based entirely on adaptability of soil and climate, within as wide limits as could be safely assumed. Preference was, however, given to parties who had reported promptly and intelligently upon other distributions.

A special importation of citron cuttings from Corsica was made under the charge of a special agent of the Department of Agriculture,

who visited that section in order that cuttings of the genuine citron of commerce might be obtained. These were distributed for propagation so that growers in the citrus regions of the United States might obtain reliable stock.

Owing to confusion in the nomenclature of the fig, an importation of cuttings of all the varieties cultivated by the Royal Horticultural Society of England was received January 29, and rooted plants November 23, 1894. These were placed with careful propagators, to furnish parties living in sections in which the fig will flourish with properly named varieties at as early a date as possible.

Although the fruit crop of 1894 was far below an average one, yet upward of 2,200 samples of fruits were received during the year, the number of new or little known varieties being greater than in any former year.

My predecessor had sent out a circular letter in which one of the requests was that correspondents should name new varieties worthy of planting. These answers had been accumulating for several years, and, anticipating the dearth of fruit, a request had been sent each correspondent to forward specimens. The general failure of the apple crop in many sections was indicated by the inability of our correspondents to furnish specimens. A fruitful year will, no doubt, bring to the front many excellent varieties that are unknown beyond the immediate neighborhood in which they originated.

The following varieties of plants were donated for distribution:

- Strawberry, 8 varieties, plants.
- Raspberry, 1 variety, plants.
- Blackberry, 1 variety, plants.
- Grape, 3 varieties; 1 cutting, 2 plants.
- Apple, 61 varieties, mostly scions.
- Pear, 11 varieties; 10 scions, 1 tree.
- Quince, 1 variety, tree.
- Cherry, 13 varieties; 7 scions, buds, and trees.
- Plum, 10 varieties, scions.
- Peach, 2 varieties; buds of 1, trees of 1.
- Pecan, 2 varieties; 1 scion, 1 seedling.
- Chestnut, 2 varieties, scions.
- Persian walnut, 1 variety, scion.
- Orange, 1 variety, tree.
- Fig, 69 varieties; 69 scions, 63 plants.
- Persimmon, 2 varieties, scions and trees.
- Juneberry, 2 varieties, plants.
- Barberry, 2 varieties, plants.
- Loquat, 3 lots, seeds.
- Quandong (Australian native peach), seeds.
- Avocado, seeds.
- Papaw, 2 lots, seeds.
- Haw (seeds for stock on which to graft apple in "black lands" of Texas), 1 lot.

THE FRUIT CROP OF THE YEAR 1894.

The season was peculiarly disastrous and unprofitable in most lines of fruit culture. In the East and South this was largely due to the unfavorable climatic conditions that prevailed during the late winter and early spring months, though the most decisive and far-reaching injury of the year was the damage done to the citrus and other semi-tropical fruits of Florida by the freeze of December 28 and 29. Fair crops of most fruits were harvested, however, in the New England, Middle Atlantic, and Lake States, and in portions of Missouri, Kansas, and Nebraska. West of the Rocky Mountains there was an abundant yield of most kinds, but losses due to the paralysis of freight traffic during the railroad strikes in June and July, together with low prices caused by the prevailing industrial depression, resulted in very low net returns to the growers and shippers of that region.

CLIMATIC CONDITIONS.

The year was characterized by exceptional extremes of heat and cold, drought and moisture in different sections. In comparison with the winter of 1892-93 that of 1893-94 was decidedly mild. The former was steadily and quite severely cold in most sections, with a rainfall below the normal except on the Pacific Coast; the latter was mild over most of the country. With the exception of one or two short periods of cold, which damaged tender fruit buds in the Mississippi Valley, New York, and New England, the weather continued "open" until late in March. The precipitation in the principal fruit-growing sections was considerably below the normal during the winter, except in the North Pacific Coast region, where the rainfall was excessive. March 29 to 25 witnessed a period of high temperature over most of the country, which in many sections exceeded any recorded maximum for the month. Stimulated by the excessive warmth and sunshine, vegetation advanced rapidly, and by March 25 the peach, the cherry, and the oriental varieties of plum and pear were in full or partial bloom over most of the territory south of latitude 40° and east of the 100th meridian. This abnormal mildness was followed, March 25 to 27, by a cold wave, during which, in many sections, the lowest recorded temperatures for the month were noted. The effect of this sudden change was destructive to most fruits in the States from Florida northward to Pennsylvania and New Jersey and westward to Kansas and Nebraska. Consequently the fruit crop in that region was very light, and in some parts of the South the trees themselves were killed or seriously injured. West of the Rocky Mountains citrus fruits were somewhat damaged by cold in January, but the yield of these was large, while the crop of most of the deciduous fruits was very large. Drought in the Mississippi Valley, Lake region, and New England during July and August lessened the prospective yield of such fruits as survived the spring frosts and materially hastened the maturing of winter varieties.

APPLES.

In consequence of the March freeze, the apple crop in the South was very light. The yield of this fruit was below the average also in most of the Eastern and Northern apple regions outside of New England, the shortage in these sections being in a large measure due to imperfect fertilization of blossoms and damage to both fruit and foliage by apple scab, which was widely prevalent. The supply of winter varieties, however, was much larger than in 1893, and prices ruled much lower.

A shortage in the apple crop of Europe stimulated the export trade in this fruit to such an extent that the quantity of apples sent abroad was more than four and one-half times as large as in 1893, and exceeded that of any year since 1888. The average value per barrel of apples exported, as given by the Treasury Department, was about 20 per cent less than in 1893. The quantities and values for the last five years are given in the following table:

Exports of apples, green or ripe.

Year.	Quantity.	Total value.	Value per barrel.
	<i>Barrels.</i>		
1890	201,538	\$618,943	\$3.07+
1891	627,222	1,696,624	2.70+
1892	670,091	1,709,356	2.55+
1893	147,269	440,874	2.99+
1894	675,996	1,624,272	2.40+

The exports of dried apples showed an increase of but 5 per cent over those of 1893, though the quantity exported in that year was the smallest since 1878. The quantities and values for the last five years, as given by the Treasury Department, are shown in the following table:

Exports of apples, dried.

Year.	Quantity.	Total value.	Value per pound.
	<i>Pounds.</i>		
1890	14,124,172	\$792,817	\$0.056+
1891	18,530,093	926,478	.049+
1892	16,295,938	835,953	.051+
1893	5,032,303	324,203	.064+
1894	5,309,293	338,869	.063+

PEARS.

The yield of pears in the South was small. The crop of Le Conte and Kieffer, the leading varieties grown in that section, was destroyed when in bloom, in March, while in some localities the trees were killed or badly injured by the freeze. West of the Mississippi the crop was also light, but in New England, the Middle Atlantic States, and the Lake States, as well as on the Pacific Coast, there was a large yield of this fruit.

Large quantities of Bartletts from California were detained or delayed by the railroad strikes, and, reaching the Eastern market in poor condition, were sold at very low prices in August, depressing the price of Eastern-grown fruit to a point where the grower realized little more than the expense of marketing.

The Bartlett has been so largely planted in commercial orchards in recent years that the wisdom of continuing to plant it for market in the Middle States may well be questioned. Earlier and later varieties of good quality will in many sections probably be found more profitable.

PEACHES, PLUMS, AND APRICOTS.

Peaches were almost a total failure in the commercial peach districts of the South except in Florida and Texas. The immense orchards of Georgia did not yield sufficient fruit for home consumption, while the total yield of the Chesapeake peninsula was estimated at 150,000 baskets, as against a crop of 7,000,000 baskets in 1893. North of Delaware, Maryland, and central Ohio there was a fair crop of this fruit in most of the commercial orchard districts. The Rocky Mountain and Pacific Slope States harvested nearly a full crop.

Plums failed in most parts of the South, owing to the frosts already noted. The Japanese varieties, being early bloomers, suffered the greatest injury. In the North, particularly in New York, the crop was very large and prices extremely low. On the Pacific Slope the yield of prunes was much smaller than in 1893, conservative estimates placing it at 40,000,000 pounds of the cured fruit, of which about 3,500,000 pounds were produced in Oregon, Washington, and Idaho, and the remainder in California.

Apricots, which are but little grown commercially in the United States outside of California, produced an abundant crop in that State, the yield being the largest ever known there.

GRAPES AND SMALL FRUITS.

The yield of grapes was very light in the early table-grape growing sections of the South, and was less than in 1893 in most of the grape districts of the Mississippi Valley and Atlantic Slope.

By a more judicious distribution of shipments among the larger cities and towns, through the instrumentality of cooperative shipping associations in the more important shipping districts, better prices were realized by many growers than for two years past.

The raisin yield in California was estimated at 55,000,000 pounds, against 85,000,000 in 1893.

Small-fruit crops were materially shortened in yield by frost in the South and by extremes of moisture and drought in the spring and summer in many parts of the North and East. The total yield of these fruits was probably less than in any previous season for several years.

But, notwithstanding the reduced supply, prices ruled low in most sections. Choice selected fruit in "fancy" packages may be marketed from year to year with comparatively little fluctuation in price. But such fruit is mainly bought by the wealthy, while the prices of the common grades are largely determined by the prosperity of the working classes.

The cranberry crop was light, that in the Cape Cod region, where a large proportion of the market supply is grown, being estimated as not exceeding one-fourth of the yield of 1893, or about 50,000 barrels. Prices ruled very much higher, the best berries bringing as much as \$10 or \$15 per barrel.

SEMITROPICAL AND TROPICAL FRUITS.

The orange crop of Florida for 1894-95, though lighter than usual in some of the older groves, promised to equal in yield any crop yet harvested because of the large acreage of young trees newly come into bearing. Of the estimated crop of 5,000,000 boxes, about half had been marketed by the end of 1894. Most of the remainder was either badly damaged or rendered entirely worthless by the freeze of December 28 and 29.

The California crop of oranges promises to be an average one, being estimated at 1,750,000 boxes.

The lemon crop of Florida was the largest ever harvested and was estimated at nearly 200,000 boxes of marketable fruit. As many of the bearing trees and nearly all the young trees recently planted were killed to the ground by the December freeze, the annual yield of this fruit in Florida will necessarily be much lighter for several years. Some of the largest lemon planters in the State are reported to have made arrangements for replacing their trees at once. The California lemon crop is reported to be an average one.

Other semitropical and tropical fruits, such as the pomelo, lime, mango, guava, and pineapple, were very greatly damaged by the freeze, being less resistant to cold than the orange. The pineapple crop of 1894 (harvested in the spring months) was the largest yet produced, the shipments from the State having amounted to 90,000 crates. The yield of this fruit will probably be much less for one year or perhaps two years, and present indications are that the future commercial plantings of this and other tropical fruits will be made farther South than has heretofore been thought necessary.

PROMISING NEW FRUITS.

Descriptions of promising new varieties of fruits and nuts of which specimens were received during 1894 are given below. Many of these varieties have not yet been introduced nor offered for sale by their originators. The Department does not propagate them nor distribute plants or scions except when they are donated by the originators for that purpose.

APPLE.

Abernathy (W. E. Crawford, Dunlapville, Ind.).—The original tree grew in one of the first orchards of Union County, Ind., about one hundred years ago. Size above medium; form roundish conical; cavity medium, irregular, marked by green or slight russet; stem one-half inch, moderately stout, somewhat fleshy at twig; basin medium, regular; calyx segments short, narrow, slightly reflexed; eye medium, open; surface smooth though finely leather-cracked; color greenish yellow, nearly overspread with mixed and striped red; dots brown with dark centers; flesh yellowish white, tinged with red near the skin, fine-grained, very tender, juicy; core large, partially open, meeting the eye; flavor subacid, sprightly; quality very good to best; season autumn. The tree is upright, spreading, long-lived, hardy; it bears alternate years.

Almota, synonym *Mays's Seedling* (C. R. Mays, Pullman, Wash.).—A seedling grown by the sender. Very large, prolate, conical, ribbed; cavity large, deep, irregular, marked by furrows and russet; stem short, one-half inch, stout, swollen toward the attachment with twig; basin large, deep, irregular, marked by furrows; calyx segments long, wide, reflexed; eye large, partially open; surface smooth, oily; color pale yellowish green, washed with dull brick-red, striped and splashed with crimson; dots numerous, minute, light gray, slightly sunken; flesh greenish white, moderately fine, very tender, juicy; core large, conical, clasping, very open; flavor mild and subacid; quality very good. Season autumn.

Benninger (W. M. Benninger, Walnutport, Pa.).—Originated on the Benninger farm in Lehigh County, Pa., about fifty years ago; the original tree is still healthy. Size above medium; cavity large, regular, very deep, marked with russet; stem 1 inch long, slender, curved; basin medium, irregular, furrowed, deep; calyx segments short, erect or slightly reflexed; eye small, closed; surface moderately smooth, with some patches of netted russet; color yellow, washed with purplish red on exposed side, and striped with crimson; dots russet; flesh yellowish, fine grained, tender, juicy; core medium, round, clasping, slightly open; flavor subacid, pleasant; quality good. Season autumn.

Blackwood (M. L. Smith, Farmington, Wash.).—Size medium; roundish conical; cavity large, roundish, deep, marked by russet and angles; stem of medium length, slender, enlarged toward limb; basin above medium, angular, deep, marked with angles and ribs; calyx segments broad, converging; eye large, closed, surface even, nearly regular; color light green with brownish blush in the sun; dots indistinct though quite large; skin thick, tough; flesh yellowish, fine grained, tender, juicy; core medium, roundish, slightly open; flavor mild subacid; quality very good. Season winter.

Bloomfield (*Bentley*), synonym *Bentley's Seedling* (John C. Bentley, Sandy Spring, Md.).—A chance seedling in Montgomery County, Md., that came into fruiting about 1880. Large, roundish; cavity large, slightly triangular, marked by heavy russet netting; stem short, one-half inch, moderately stout, often with fleshy knobs; basin wide, deep, marked with furrows and slight leather-cracking; calyx segments short, some of them reflexed; eye large, open; surface smooth; color yellowish, washed with crimson, striped with darker red, and overspread with gray; dots conspicuous, russet, raised; flesh yellow, with a darker core line; core medium, conical, clasping, partially open; flavor subacid, rich; quality good to very good. Season early autumn.

Bridgeton (J. J. Towle, South Carthage, Me.).—Size large; form roundish oblate; cavity large, regular, marked by light russet and three raised lines running out over the fruit; stem three-fourths inch, medium, fleshy next the fruit; basin medium in size and depth, regular, marked by russet and by shallow furrows; eye medium, open; surface smooth; color greenish yellow, with blush on exposed side; dots numerous, minute, brown; skin thin; flesh yellowish white, fine grained, tender, moderately juicy; core medium, round, meeting, closed; flavor very mild subacid; quality very good. Season autumn.

Chippin (James Shepard, New Britain, Conn.).—Originated in Bristol, Conn., and named in honor of an Indian chief. Small, roundish conic; cavity medium, deep, regular, marked with brown; stem short, stout; basin small, shallow, regular, furrowed; calyx segments broad, long, reflexed; eye small, closed; surface smooth, regular; wholly striped and splashed with bright red on a dull greenish-yellow base; dots numerous, large, dark, indented; flesh yellowish, firm, crisp, juicy; core quite large, round, clasping, closed; flavor sprightly, subacid; quality very good. Season winter. Has a local reputation as a long-keeping variety, being marketed late in summer of the year after harvesting the crop.

Colfax (John R. Reavis, Spokane, Wash., and George Ruedy, Colfax, Wash.).—Originated with Nelson Davis, Colfax, Wash., about 1886, as a sprout from the seedling stock of a Rhode Island Greening tree that was accidentally broken off near the ground. The tree has borne fairly for three years. The fruit was awarded first prize as the best seedling apple at the Spokane fruit fair, in October, 1894. Very large, roundish oblong; cavity irregular, deep, marked by green russet; stem 1 inch long, of medium diameter, uniform; basin medium, irregular, furrowed; calyx segments long, broad, reflexed; eye large, open; surface smooth, irregular; color bright yellow, striped and splashed with crimson; dots numerous, minute; skin thin; flesh yellowish, firm, crisp, juicy; core medium, roundish, clasping, closed; flavor subacid, good for cooking, rather sharp for dessert; quality good. Season winter.

Corner (J. R. Hawkins, Mountainville, N. Y.).—Size above medium; oblate; cavity wide, deep, marked by russet netting; stem one-half inch, medium diameter; basin medium, regular, marked by russet; calyx segments with mammiiform bases, wide, long, converging or slightly reflexed; surface moderately smooth; color yellow, washed with red and striped with crimson; dots numerous, russet, some with dark centers, depressed; flesh yellowish, moderately fine grained, tender, moderately juicy; core large, wide, clasping, closed; flavor mild subacid; quality very good. Season early winter. Well known locally in Orange County, N. Y.

Corona, synonym *Corona Pippin* (L. Van Wickel, Corona, Long Island, N. Y.).—A seedling of Newtown, originated about twenty years ago. Large, roundish oblate, oblique; cavity large, deep, irregular, marked with russet; stem short, stout; calyx segments moderately long, converging; eye small, closed; surface rough, irregular; color yellow, with a slight bronzing, and considerable russet in patches; dots numerous, both large and small, dark; flesh yellow, fine grained, firm; core large, roundish conical, clasping, open; flavor mild subacid, sprightly, pleasant; quality good. Season winter. This apple has the form, size, and many of the good qualities of its parent, but is hardly so delicate in flavor.

Corp Choice (Henry Sillery, McConnellsville, Ohio).—Originated by George Corp, of Washington County, Ohio. Size medium, roundish, truncate; cavity medium, regular, marked with slight russet; stem three-fourths inch to 1 inch, slender; basin small, regular, marked with shallow furrows; calyx segments wide, short, reflexed; eye small, closed or partially open; surface smooth; color greenish yellow, washed and splashed with mixed red and purple, striped with dark crimson; dots yellow or brown; skin thin; flesh yellow, moderately fine grained, tender, moderately juicy; core medium, round, clasping, partially open; flavor mild subacid, rich; quality very good. Season winter.

Cuba (William Stammer, South Osborn, Wis.).—Tree about thirty-nine years old, grown from seed brought from New York. Medium to large, oblong conic; cavity large, deep, regular, marked with dark russet; stem 1 inch, moderately stout; basin medium, irregular, marked by deep and abrupt furrows; calyx segments broad, short; eye large, closed; surface smooth, irregular; color yellow, washed with pale red; dots numerous, large, prominent, dark; flesh yellowish, fine grained, firm, juicy; core medium, wide, meeting, open; flavor mild subacid, sprightly; quality very good. Season winter.

Du Bois (Frank P. Studley, Claverack, N. Y.).—Size above medium; oblate; cavity wide, of medium depth, marked with russet netting; stem one-half inch, moderately slender; basin wide, of medium depth, marked by deep furrows; calyx segments wide, short, converging or reflexed at point; eye medium, partially open; surface moderately smooth, with russet knobs, erupted russet dots, and an occasional russet patch; color yellow, washed with mixed red over nearly the entire surface, striped with crimson and overspread with gray; dots distinct, whitish yellow, many indented; flesh yellowish white, stained with red, coarse grained, breaking, juicy; core medium, conical, scarcely clasping, closed; flavor mild subacid; quality good. Season winter. Tree upright, with round head, a good grower, and very productive in alternate years, with a light crop in the off year.

Fall Gem (John N. Cheney, Sidell, Ill.).—Found as a very small seedling in fence corner, about 1878. Size above medium; roundish oblate; cavity medium, regular, marked by fine russet netting; stem of medium size, five-eighths inch, enlarged at twig; basin medium in size and depth, marked with furrows and bloom; calyx segments medium to small, some slightly reflexed; eye very small, closed; surface smooth, except an occasional russet knob; color yellowish white, washed, shaded and splashed with bright red and striped with crimson; dots gray or yellowish, slightly depressed; flesh whitish, tinged with red, fine grained, tender, juicy; core large, clasping, open; flavor subacid, sprightly; quality very good. Season autumn.

Frankiana (Henry Shimer, Mount Carroll, Ill.).—A chance seedling, replanted from a fence row to its present position. Size large; form roundish conic; cavity wide, deep, marked by very fine russet netting; stem one-half inch, moderately stout; basin medium, deep, irregular, marked by shallow furrows and patches of russet; calyx segments narrow, long, converging; eye medium, closed or partially open; surface moderately smooth, with some patches of russet netting; color yellow, washed with dull, mixed red, splashed and striped with crimson; dots numerous, russet; flesh yellowish, moderately fine grained, tender, moderately juicy; core large, conical, clasping, open; flavor very mild subacid or sweet; quality very good. Season early winter.

Great Bearer (Henry S. Rupp, Shiremanstown, Pa.).—Size small; oblate, inclining to conic; cavity large, deep, regular, marked by stripes of greenish russet; stem one-half inch, moderately slender, knobbed at twig; basin large, wide, moderately deep, marked by furrows; calyx segments medium in length and width, often broken near their bases; eye large, partly open; surface smooth, somewhat irregular, with occasional russet knobs; color yellowish, washed with red over entire surface, dark purplish red on the exposed side, with a slight tendency to striping; dots numerous, conspicuous, large, light russet; skin thin, firm; flesh yellowish, firm, tender, fine grained, moderately juicy; core large, wide, clasping, slightly open; calyx tube quite deep, with perpendicular sides; flavor mild subacid; quality good. Season winter. One of the profitable orchard apples of York County, Pa. Specially recommended for cider.

Greenwich (Isaac Hicks & Son, Westburg, N. Y.).—Originated in the town of Greenwich, Conn. Size large; roundish oblate; cavity medium, regular, marked with fine russet; stem 1 inch, moderately slender; basin medium, regular, marked by shallow furrows and leather cracks; calyx segments short, stout, erect, meeting over the eye; eye small, closed; surface somewhat rough; color greenish yellow, washed with red, striped with crimson, and overspread with gray at the stem end; dots conspicuous, russet; flesh yellow, fine grained, tender, juicy; core large, conical, clasping, nearly closed; flavor mild subacid, rich; quality very good, nearly best. Season autumn.

Gregg (Warren C. Gregg, Pennville, Ind.).—Size large; form oblate; cavity large, deep, regular, marked with russet; stem one-half inch, stout; basin wide, deep, marked by furrows; calyx segments short, meeting; eye medium, open; surface moderately smooth; color greenish yellow, lightly washed with dull red and striped with

darker red; dots conspicuous, brown; flesh yellowish, moderately coarse, tender, juicy; core small, roundish conical, clasping, nearly closed; flavor brisk subacid, sprightly; quality very good. Season autumn.

Harlow (Mrs. Kate L. Harlow, Grand Junction, Colo.).—A seedling, originated about 1888. Size large; oblate, conical; cavity large, deep, regular; stem three-fourths inch, moderately stout, with bracts; basin medium, deep, marked by sharp folds and a little russet; calyx segments stout, erect, meeting over the eye; eye medium, partially closed; surface very smooth; color clear greenish white with a suggestion of red; dots large, numerous, white; skin moderately thick, tender, acid; flesh very white, tender, fine grained, juicy; core large, wide, conical, clasping, nearly closed; flavor acid to subacid; quality good for culinary purposes. Season summer.

Holman (Russet) (J. J. Towle, South Carthage, Me.).—Resembles Pomme Gris quite closely but appears to be more subacid. Size small; oblate, slightly conical; cavity large, regular, marked by netted russet; stem one-half inch, moderately stout, with bracts; basin small, regular, marked by shallow furrows; calyx segments short, wide, meeting over the small and nearly closed eye; surface moderately smooth for a russet apple; color rich russet, delicately washed and striped with red on exposed side, dots numerous, light gray; skin thin; flesh yellowish, moderately fine, tender, juicy; core large, wide, clasping, open; flavor mild subacid, aromatic; quality very good to best. Season winter.

Ida (William Stammer, South Osborn, Wis.).—Size medium; roundish conical; cavity medium, deep, irregular, marked by russet; stem three-fourths inch, stout; basin small, irregular, marked by furrows and leather-cracking; calyx segments short, narrow, reflexed; eye small, open; surface smooth, regular; color bright yellow, striped and splashed with bright red; dots scattered, small, dark; bloom light; skin thick, tender; flesh yellow, fine grained, firm, crisp, juicy; core medium, wide, meeting, closed; flavor mild subacid, pleasant; quality very good. Season winter.

Kantz (William Stammer, South Osborn, Wis.).—Size large; roundish oblate; cavity wide, deep, regular, marked by green russet; stem one-half inch, stout; basin large, deep, irregular, furrowed; calyx segments broad, long, reflexed; eye large, open; surface smooth; dots numerous, small, prominent, light; flesh yellowish white, granular; core medium, oval, clasping, closed; flavor subacid; quality very good. Season autumn.

Kerr (Greening) (J. W. Kerr, Denton, Md.).—A valuable apple for the Chesapeake peninsula, found in a thicket some years ago. The fruit bears a strong resemblance to Green Vandevere as grown in Pennsylvania. Size medium; form flat, regular; cavity regular, large, bronzed; stem short, uniform; basin very broad, deep; calyx segments small, flat; eye wide, quite open; surface somewhat roughened by russet dots, cracks, and markings; color greenish white, with red over color; dots many, greenish russet; skin thick, rigid, brittle; flesh yellowish white, very firm, breaking; core medium, conical, clasping, slightly open; flavor subacid; quality good. Season spring.

Klickitat (H. C. Cook, White Salmon, Wash.).—Originated about 1876. Size large; roundish, prolate, ribbed; cavity medium, regular, marked with green and slight russet; stem one-half inch, stout, fleshy; basin medium, irregular, marked with shallow furrows; calyx segments wide, of medium length, converging or slightly reflexed; eye large, closed or partially open; surface very smooth, glossy; color yellow, washed with carmine and striped with crimson; dots minute to medium, yellow and russet, indented; flesh yellowish, coarse grained, tender, moderately juicy; core large, conical, clasping, open; flavor very mild subacid; quality good to very good. Season winter.

Manor (Henry S. Rupp, Shiremanstown, Pa.).—Size medium; roundish, slightly conical; cavity wide, deep, marked by green russet and prominent lip; stem three-

fourths inch, angular, with fleshy ribs; basin medium, regular, marked by shallow furrows and russet netting; calyx segments wide, moderately stout; eye medium, partially open; surface smooth, oily; color greenish yellow, washed with light and purplish red, splashed and striped with dark purplish crimson; dots numerous, russet, indented; skin thin, tender; flesh yellowish, fine grained, tender, moderately juicy; core large, roundish, meeting, nearly closed; flavor mild subacid, aromatic; quality very good. Season early winter.

Newby (Thomas T. Newby, Carthage, Ind.).—Grown in Rush County, Ind., for forty years or more, and believed to be a hitherto unnamed variety. Size, large; oblate, slightly oblique; cavity medium, regular, marked with green and russet; stem one-half inch, stout; basin large, irregular, marked by large folds; calyx segments long, broad, reflexed; eye very large, open; surface very smooth, polished, having a red, metallic luster; color greenish yellow, striped and splashed with bright coppery red; dots numerous, brown and gray; skin thin, tough; flesh very yellow, rather coarse grained, juicy; core small, wide, clasping, closed; flavor mild subacid; quality good. Season winter.

Newport (*Winter Sweet*) (Dr. T. H. Hoskins, Newport, Vt.).—A seedling at Newport, Vt., found upon one of the earlier settled farms on the west shore of Lake Memphremagog. Size medium; round conical; cavity medium, irregular, marked by russet; basin small, regular, marked by leather-cracking; calyx segments short, broad; eye small, partially open; surface smooth; color green, shaded with dull red about the apex; dots, numerous, small, dark, prominent; flesh white, firm, dry; core large, wide, meeting, open; flavor sweet; quality good. Season winter. Tree of spreading habit; a good bearer, and begins to bear early; is quite ironclad in hardiness.

Oel (A. F. Clark, Raymondville, N. Y.).—Size small; roundish conical; cavity small, regular, marked with green russet; stem long, slender; basin very small, regular, marked by furrows; calyx segments narrow, short, converging over the eye, slightly reflexed; eye very small, nearly closed; surface smooth; color yellow, washed with bright red and splashed with crimson; dots numerous, russet, sunken; skin thin; flesh yellowish white, fine grained, firm, crisp, juicy; core large, oval, meeting, wide open; flavor mild subacid; quality good. Mr. Clark says: "The original tree is 16 to 18 inches in diameter, on an almost barren soil." He has no doubt that it is a seedling of Bethel, but believes that the faults of Bethel are corrected in this, in that the fruit is of uniform quality and a little more acid than Bethel. The tree is straight, thrifty, and handsome, and as hardy as the hardiest ironclad. Season early winter.

Parlin (C. D. Holbrook, North Madison, Me.).—The original tree, over fifty years old, is at Norridgewock, Me.; it is still vigorous, healthy, and productive. Size large; roundish conical; cavity wide, deep, marked by fine russet netting and somewhat lipped; stem one-half to three-fourths inch, slender; basin small, regular, abrupt, marked by fine furrows; calyx segments wide, long, converging, reflexed from middle; eye small, closed; surface smooth; color pale yellow, washed with red, splashed and striped with crimson; dots numerous, small, light; skin moderately thick; flesh yellowish, moderately fine and tender, moderately juicy; core medium, conical, clasping, nearly closed; flavor subacid; quality good. Season fall and early winter.

Pinkham, synonym *Pinkham's Keeper* (T. A. Pinkham, Hurlington, Ohio).—A seedling among the early plantings in Clermont County, Ohio; the original tree still stands. Size small; form ovate; cavity medium, deep, regular, marked by russet; stem five-eighths inch, slender; basin medium, regular; calyx segments long, slender, reflexed; eye medium, closed; surface smooth, regular; color yellow, splashed and striped with dull red; dots numerous, large, yellow, prominent; bloom thin, gray; skin thin, tender; flesh yellowish, fine grained, tender; core of medium size, wide, clasping, partially open; flavor subacid; quality good. Season winter.

Scott Winter, synonym *Scott's Winter* (Dr. T. H. Hoskins, Newport, Vt.).—Originated on the Scott farm at Newport, about 1864. Size medium; form oblate; cavity large, regular, marked with greenish russet; stem one-half inch, moderately stout; basin medium, regular, abrupt, marked by fine furrows and fine russet netting; calyx segments wide, short, converging; eye small, closed; surface smooth; color yellowish, washed, striped, and splashed with mixed red and dark purplish crimson; dots indistinct, minute; skin thick; flesh yellowish, slightly tinged with red, moderately fine, breaking, juicy; core medium, roundish, clasping, open; flavor subacid; quality good. Season early winter.

Shelley (J. C. Flewellin, Merritt Corners, N. Y.).—Found about 1880 as a very small tree near a fence at Kensico, N. Y. Size large; oblate, with unequal sides; cavity medium, wide, marked by thin russet; stem three-fourths inch, slender, with bracts; basin large, wide, marked with furrows; calyx segments wide, short, erect or pointing over the eye; eye large, open; surface very smooth, oily; color greenish yellow, washed with dull crimson and striped with brighter hue; dots large, russet, many with dark centers, aureole; flesh yellowish, fine grained, tender, juicy; core medium, conical, meeting, partially open; flavor subacid, sprightly; very good to best. Tree is an upright grower; bark smooth and shiny; fruit clings well to the twig. Season autumn and early winter.

Sneed (Cider) (Sneed Bros., Pronto, Ala.).—Size medium; roundish oblate, with unequal sides; cavity, medium, nearly round, abrupt, slightly russeted; stem short, knobbed; basin quite deep, regular, with a rounding slope, marked with slight ribs and distinct, heavy bloom; calyx segments green, meeting irregularly over the eye; eye above medium, closed; surface smooth, oily, glistening; color green till mature, then a yellowish-green base with red stripes and splashes and some russet patches; dots numerous, irregular, sometimes russet; flesh white, quite tough, moderately juicy; core quite small, oblate, conical, clasping, slightly open; flavor quite sharp acid; said to be fine for cider. Season July. Tree of slow growth; an abundant and sure bearer.

Special (William Stammer, South Osborn, Wis.).—Size medium; roundish oblate; cavity medium, deep, regular; marked with russet dots; stem three-fourths inch, moderately thick; basin medium, deep, irregular, marked by furrows; calyx segments broad, of medium length, reflexed; eye medium, closed; surface smooth, regular; color yellowish green, striped and splashed with pale red; dots numerous, indistinct; bloom thin; skin thin, tender; flesh yellow, fine grained, juicy; core large, wide, meeting, open; flavor mild subacid, almost sweet; quality very good. Season winter.

Spy Wine (Joseph C. Ratliff, Richmond, Ind.).—Size above medium; roundish conical; cavity medium, irregular, marked with russet nettings; stem one-half inch, fleshy; basin small, regular, marked with furrows; calyx segments short, somewhat reflexed; eye small, closed; surface moderately smooth, though the russet dots, which are numerous, give a somewhat rough appearance; color yellow, washed with dull brick red, striped with darker red; flesh yellow, rather coarse, tender, melting, juicy; core large, conical, clasping, partially open; flavor mild subacid, aromatic, rich; quality very good. Season autumn.

Steptoe (John R. Reavis, Spokane, Wash.).—Grown from seed by John Thomson, of Whitman County, Wash., about 1882. Size large; roundish, slightly ribbed; cavity medium, regular, marked by slight russet; stem $1\frac{1}{4}$ inches, slender, with fleshy enlargement at connection with fruit; basin small, shallow, regular, marked by shallow furrows; calyx segments medium in length and width, converging or slightly reflexed; eye very small, closed; surface smooth, oily; color pale yellow; dots variable, grayish on surface, brown under the surface; flesh yellowish, fine grained, crisp, juicy; core large, roundish, clasping, nearly closed; flavor subacid; quality very good. Season early winter. The tree is a strong grower and a regular bearer.

Sweet Orange (Kennan & Son, Rogers, Ark.).—Size above medium; oblate, slightly oblique; cavity wide, deep, marked by fine leather-cracking and light-green bloom; basin medium, regular, marked by shallow furrows, leather-cracking and greenish-

white bloom; calyx segments narrow, short, separated, reflexed; eye small, open; surface moderately smooth, with some russet leather-cracking; color handsome lemon yellow; dots numerous, variable in size and form; bloom only in cavity and basin; skin thick; flesh yellow, with darker yellow veins, moderately fine, crisp, moderately juicy; core small, oval, clasping, closed; flavor sweet; quality good. Season winter.

Talent (William Stammer, South Osborn, Wis.).—Size large; roundish oblate; cavity large, deep, irregular, marked by green and russet; stem five-eighths inch, stout; basin medium, deep, regular, marked by furrows; calyx segments broad, short, reflexed; eye large, open; surface smooth, regular; color yellow; dots numerous, large, dark, prominent; flesh yellow, tender, juicy; core medium, oval, clasping, slightly open; flavor rich subacid; quality very good. Season winter.

Weltry (J. C. Flewellin, Merritt Corners, N. Y.).—Said to have originated near Chappaqua, N. Y. Size medium; roundish oblate; cavity medium, deep, marked by green russet; stem three-fourths inch, slender; basin medium, shallow, irregular, marked by ribs and russet; calyx segments narrow, short, reflexed; eye small, closed; surface smooth, irregular; color light green, blushed with dull red on exposed side, and with considerable russet near basin; dots small, both dark and light colored, scattered; skin thin; flesh yellowish, fine grained, crisp, juicy; core large, clasping, slightly open; flavor mild subacid, rich, pleasant; quality very good to best. Season winter.

Winter Maiden Blush (D. B. Alexander, Winnebago, Ill.).—Size large; form oblate; cavity large, deep, regular, marked with russet; stem three-fourths inch long, of medium size, slightly curved; basin of medium size and depth, regular, furrowed, ridged, and marked with mammiform calyx bases; calyx segments wide, short, lapping, converging or slightly reflexed; eye small, closed; surface smooth, polished; color yellow, with handsome carmine blush and fine golden russet veining; dots numerous, yellow or brown; skin thin; flesh yellowish, slightly stained, fine grained, tender, juicy; core large, wide, clasping, open; flavor mild subacid; quality very good. Season winter. This variety, the true Winter Maiden Blush, originated in Pennsylvania, and is well known there. It should be more widely disseminated. Downing's description of it is faulty, hence the insertion here.

Winterwood (Dr. Henry Shimer, Mount Carroll, Ill.).—Size small; form oblong; cavity small, narrow, deep, russet; stem one-half inch, slender; basin medium, regular, marked with fine furrows and down; calyx segments of medium width and length, converging or slightly reflexed; eye small, closed, or partially open; surface very smooth; color greenish yellow, washed with carmine, and indistinctly striped with crimson; dots numerous, grayish, some of them areolar; flesh yellowish, slightly stained near calyx tube and next the skin, fine grained, moderately tender, juicy; core medium, conical, clasping, open; flavor very mild subacid, almost sweet; quality good to very good. Season winter.

Yakima (H. C. Cook, White Salmon, Wash.).—A seedling of Baldwin. Size large; roundish conical, ribbed; cavity large, deep, marked with russet or green; stem three-fourths inch, moderately stout; basin large, deep, irregular, marked with deep corrugations; calyx segments wide, of medium length, converging closely; eye small to medium, closed; surface very smooth; color yellow, washed with carmine, splashed and striped with crimson; dots numerous, yellow, indented; skin thin; flesh yellow, moderately fine, juicy; core large, conical, clasping, nearly closed; flavor subacid; quality good. Season winter. A very handsome apple with form and color resembling Tompkins King, and with texture and flavor quite like Baldwin.

PEAR.

Pillsbury (Charles S. Pillsbury, Londonderry, N. H.).—Size medium; pyriform; cavity small, shallow, irregular, lipped; stem five-eighths inch to 1½ inches, medium to stout, curved, brown, set on side of lipped cavity; basin medium, regular, marked by russet nettings; calyx segments short, erect or slightly reflexed; eye small, open;

surface smooth; color yellow, with a delicate crimson blush on exposed side, and numerous patches of smooth russet; dots very numerous, small, brown; skin thin; flesh whitish, fine grained, buttery, melting, juicy; core small, oval, clasping, closed; flavor subacid, sprightly, rich; quality very good. Season late summer. The tree grew from seed planted about 1870; it has been bearing well since 1882.

Shell (D. E. Longsdorf, Mechanicsburg, Pa.).—Size above medium; roundish pyriform, quite regular; cavity broad, concave, regular; stem about 1 inch, rather stout; basin roundish, of medium size and depth; calyx segments small, irregularly separated and converging; eye medium, partially open; surface quite even; color greenish yellow, modified by many large russet dots; flesh whitish buttery, dry; core oval, small, closed; flavor very mild; quality only good. A seedling by a Mr. Shell, of York County, and by him said to be blight proof. Season September 1.

Studley (Frank P. Studley, Claverack, N. Y.).—A chance seedling, similar to Bartlett in form, but showing more russet and lacking the peculiar lumpy surface of that variety. Size medium; unequal pyriform, somewhat angular, and tapering toward stem; cavity nearly or quite obsolete; stem 1 inch to 1½ inches, moderately stout, woody, swollen at attachment to fruit; basin small, of medium depth, slightly angled, abrupt, marked with russet; calyx segments narrow, quite long, divergent; eye medium, open; surface somewhat rough with numerous gray russet dots; color dull russet yellow; skin thick, firm, somewhat bitter, desirably tough, suited to long shipment of fruit without injury; flesh yellowish white, fine, melting, with few small granules, juicy; core small, oval, clasping, slightly open; flavor quite acid, free from astringency, refreshing; quality good. Season October 1 to 20. Tree a heavy annual bearer, and thus far free from blight.

QUINCE.

Borgeat, synonyms *Springfield*, *Golden Prolific* (Fred. E. Young, Rochester, N. Y.).—Origin France, recently introduced to this country. Size large; roundish, necked, and slightly ribbed; cavity medium, irregular, marked with furrows; basin large, deep, irregular, marked by deep, narrow furrows, downy; calyx segments wide, of medium length; eye small, closed; surface smooth, oily; color bright lemon yellow, with dark russet on the neck; dots minute, brown; skin thick; flesh yellowish, rather coarse grained, crisp, juicy; core large, oval, clasping, open; flavor subacid, aromatic; quality good. Ripens between Orange and Champion. It is said to keep till February and to be an early and fruitful bearer. Tree reported to be a very strong grower, retaining its leaves later in autumn than other varieties.

CHERRY.

Hoke, synonym *Wirt* (John Keech, Spry, Pa.).—A variety of the Duke class, long known locally in York County, Pa., and regarded as worthy of wider dissemination. Size large; broad, roundish, heart shape; color solid, dark purplish red; skin quite thick, rather tough, resisting rot in rainy weather; stem long, moderately thick, swollen at either end; flesh dark, pink, firm, meaty; stone of medium size; flavor subacid, sprightly; quality best. Season middle of June.

Mr. Jacob Aldinger, of York, Pa., states that this variety originated at Hanover, Pa., and was propagated by a certain Henry Wirt, from whom Mr. Aldinger's father secured scions in 1846, with which a tree was grafted on his farm at Spry, York County, Pa., the variety being designated as the "Wirt." The farm was sold to a Mr. Hoke in 1848 and the cherry has been locally known, propagated, and marketed under his name to such an extent that the name "Hoke" has become well established.

Lambert (George D. Sargent, secretary State Board of Horticulture, Portland, Oreg.).—A chance seedling, originated with J. H. Lambert, near Milwaukee, Oreg., in 1887 and donated to the State Horticultural Society for introduction. A vigorous grower and very productive. Fruit large to very large; obtuse heart shape, compressed on sutured side; suture a mere line; stem short, stout; seed small; color

dark amber, becoming covered at maturity with dark rich magenta, the ground color showing mottled; flesh dark, rich, firm, juicy, with sprightly flavor. Season July 15 to 25 in Multnomah County, Oreg.

Waterhouse (J. M. Ogle, Monmouth, Oreg.).—Originated by Dr. Warren Waterhouse, of Monmouth, about 1873. A variety of the Bigarreau class. Size large; form compressed heart shaped; cavity large, round; stem long, slender; suture a line on the flattened surface, from stem to apex; apex a light-brown spot, depressed; surface smooth, glistening; color yellowish white with bright red cheek, sometimes nearly solid red; dots very numerous and very small; skin firm; flesh whitish, tinged with yellow, firm, juicy; flavor vinous, sprightly; quality very good.

PEACH.

Artz (Allen Dodge, Washington, D. C.).—A seedling clingstone of large size and handsome appearance, grown in Georgetown, D. C. Form roundish oval; cavity deep, abrupt, oval, of medium breadth; suture shallow, from cavity to apex; apex a fleshy point raised about one-eighth inch above general surface; surface velvety; color creamy white, blushed and marbled with crimson; dots numerous; down short; skin thin, tough; flesh white, tinged with red around the stone, firm, very juicy; stone of medium size, oval; flavor very mild subacid, almost sweet, sprightly; quality very good.

Capital (K. A. Orvis, Columbus, Ohio).—A seedling about seven years old, that has been fruiting four years. Size above medium to large; form roundish; cavity broad, deep, marked with dark crimson; stem of medium length and size, tapering from the fruit; suture from cavity to apex, deep at cavity; apex a fleshy point at end of suture; surface velvety; color yellow, with slight blush; down medium, loose; skin thin, tenacious; flesh lemon yellow, with darker yellow veins, tinged with red at the stone, firm but tender; stone very small, oval, free; flavor subacid, sprightly, rich; quality very good. Season October 1 to 10.

Carman, synonym *Pride of Texas* (Stubenrauch Fruit Company, Mexia, Tex.).—A chance seedling, of the North Chinese type. Size large; broad oval, pointed, somewhat compressed; suture deep near cavity, shallow toward apex; apex fleshy, protruding; surface rather harsh; down short, persistent; color yellowish white, blushed and dotted with red; skin thin, not closely adherent; stone quite large, long, oval, pointed, free; flesh yellowish white, slightly tinged with red at the stone; flavor sprightly, vinous, slightly bitter. Season middle of June, in Limestone County, Tex. Tree reported to be productive, and fruit entirely free from rot; leaves large, with reniform glands; blossoms very large.

Donegal (H. M. Engle, Marietta, Pa.).—Size large; form roundish; yellow, sprinkled with dark red, and showing a fine, purplish-red blush; cavity large, deep, regular; suture from cavity to apex, shallow except at apex; apex a black point, set deep in fruit at end of suture; surface velvety; skin thin, tenacious; flesh rich, yellow, tinged with red at the stone, tender, melting, juicy; stone small, oval, free; flavor subacid; quality good to very good. Season October 1 to 10; later than Smock in Lancaster County.

Marcella (E. T. Daniels, Kiowa, Kans.).—Size large; form roundish; lemon yellow, with purplish blush on exposed side; cavity large, deep, round, marked with pink; suture from cavity to one-half inch past apex, shallow; apex a double point in suture; surface velvety; down short, loose; dots minute, pink; skin thin, tenacious; flesh yellow, with light yellow veins, tinged with red at the stone, melting; stone medium, oval, free; flavor brisk subacid; quality very good. Season October 1.

PLUM.

Bittern (S. D. Willard, Geneva, N. Y.).—*Prunus domestica*; size small; oval, slightly necked; purple, with bluish bloom; dots few, minute; skin thick, acid; flesh greenish, translucent, firm, juicy; stone long, oval, cling, of medium size; flavor brisk subacid; quality good. Season late summer.

Heron (S. D. Willard, Geneva, N. Y.).—*Prunus domestica*; size above medium; form roundish; coppery red, shaded and blotched with dark purplish red; dots minute, light colored; bloom bluish white; skin harsh, acid; flesh greenish yellow, firm, meaty, moderately juicy; stone, wide, oval, large, nearly free; flavor subacid; quality good. Season late summer.

Korai (Quetsche) (C. E. Hoskins, Springbrook, Oreg.).—No. 26 of the Hungarian scions sent to Mr. Hoskins from the Department in February, 1893. *Prunus domestica*; size below medium, oblong, ovate, unequal; purple, slightly modified by dots or bloom; dots many, small, indented, brown; skin thick, tough; flesh yellowish green, melting, rather coarse; stone medium, narrow, pointed, cling; flavor subacid; quality good. Season middle of August.

Large Queen (C. E. Hoskins, Springbrook, Oreg.).—No. 32 of the Hungarian scions sent to Mr. Hoskins from the Department, in February, 1893. *Prunus domestica*; size medium; dark wine color, but little modified by dots or bloom; dots many, conspicuous, quite large; bloom light blue; skin quite thick, moderately tender; flesh greenish yellow, somewhat coarse, salvy; stone quite large, cling; flavor mild subacid; quality good. Season August 15 to 30.

Paquet (Peter Paquet, Oregon City, Oreg.) (Plate I).—A seedling in 1889, of *Prunus domestica* type. Size very large; oval, truncated; cavity large, deep, regular, marked with fine leather-cracking and bloom; stem 1 inch or less, moderately stout, curved; suture from cavity to apex, of moderate depth; apex a small dot in the end of suture; surface smooth; color yellow, washed with red and overspread with a light-blue bloom; dots numerous, slightly depressed, golden; skin thick; flesh yellowish, veined, tender, meaty; stone oval, semicling; flavor mild, almost sweet; quality very good. Season August 20.

Tucker (Ezra W. Tucker, Williamsfield, Ill.).—*Prunus hortulana*, size medium to large; oval, with neck; light purplish red on greenish yellow; dots numerous, small, gray; skin thick, tender, slightly acid but not acrid; flesh yellowish, translucent, tender, juicy; stone large, angular, cling, though free from the flesh at some points where cavities are found, similar to those in Kelsey and other Japanese varieties; flavor mild, almost sweet; quality very good. Season latter part of August. The tree is said to resemble Wild Goose. The stone from which it was grown was taken from the ground in a cluster of Weaver, Miner, Wild Goose, and two prune trees. The original tree is three or four years old, and fruited first in 1894.

PERSIMMON.

Hicks, synonym *Superior* (E. H. Trueblood, Hitchcock, Ind.).—A choice native variety, the trees of which have been propagated and their fruit marketed locally for many years. Size medium; color dull, grayish red; seeds somewhat numerous, of medium size; flavor sweet and rich, free from astringency when fully ripe; very good.

Specimens of the fruit of this variety, dried in the shade without sugar, were found to be of excellent quality, and almost equal to imported dates. Mr. Hicks reports that the fruit begins ripening early and continues for a period of six weeks, and that the trees are very productive. The original tree has not failed to fruit annually for the past twenty-five years. The fruit is locally sold by the gallon or in baskets containing two-thirds of a gallon, which sell for 10 to 20 cents each. Some families buy several gallons at a time and put them down in sugar; some use the fruit in puddings; others make a persimmon "leather," which is very palatable. When shipped to city markets the fruit is packed in berry crates.

GRAPE.

Campbell Early (George W. Campbell, Delaware, Ohio).—A seedling of Moore Early crossed with pollen of a choice seedling that resulted from a cross of Muscat Hamburg on Belvidere. It is regarded by Mr. Campbell as the finest grape in all respects that he has produced in forty years of experimenting. Cluster large,

shouldered, moderately compact; stem large, long, strong; berry large, nearly round, slightly elongated, black, with profuse, light-blue bloom; skin thin, with slight pulpiness; flesh translucent, very tender and very juicy; flavor sweet, rich, aromatic; aroma delicate, not foxy; quality best, for both market and dessert. Season early.

SMALL FRUITS.

BLACKBERRY.

Allen (W. B. K. Johnson, Allentown, Pa.).—Size medium to large, irregular, oblong or oval; surface moderately regular, glossy, with few adherent pistils; color jet black, not fading; seeds small, very tender; flesh firm, compact, very juicy, shipping quality good; flavor mild, sweet, with hardly enough acidity; quality good. Season apparently with Early Harvest. Mr. Johnson says of it: "For bearing it surpasses any other variety I ever had on my grounds. Canes stronger than Kittatinny, less thorns and not so brave."

Americus (J. H. Langille, Kensington, Md.).—Size medium to large; irregular, oval or oblong conic; color jet black; flesh moderately firm, melting, juicy; quality very good. Ripens close after Early Harvest. Mr. Langille thinks it a seedling of Early Harvest. The plant is reported to be a stout, strong grower, with flowers in rather short, erect, downy spikes.

GOOSEBERRY.

Jewett (George H. Andrews, Clarkson, N. Y.).—A chance seedling found in a pasture lot. Size large; form oblong; color whitish green, changing to blotched and stippled red; seeds numerous, large, light brown; flesh purplish, pulpy, moderately firm, moderately juicy; subacid, rich. Season early.

Portage (A. H. House, Mantua Station, Ohio) (Plate II).—A chance seedling in 1874. Fruit solitary, evenly distributed; size large to very large; oblong oval; stem one-half inch long, moderately stout; surface moderately smooth, dull, slightly downy, with an occasional prickle; color yellowish green, with bronze dots near stem and along suture on some specimens; flesh translucent, greenish, quite firm, pulpy, melting, moderately juicy; shipping quality good; flavor mild subacid, rich; aroma not marked; quality very good. Season middle of July.

RASPBERRY (BLACK).

Gault (W. C. Gault, Ruggles, Ohio).—Size medium to large, borne in compact clusters, with stout stems and pedicels; fruit dull black, with thin bloom, fine grained compact, moderately juicy, with very good shipping qualities. Season early to very late. Specimens of the fruit received from Mr. Gault late in September were larger and of better quality than specimens received early in July. Very promising for market.

RASPBERRY (RED).

Miller (Charles Wright, Seaford, Del.).—Size large; bright crimson; flesh firm, rather dry, moderately juicy, sprightly, subacid, rich; quality very good. Reported to have been found wild near Wilmington, Del. Resembles the Brandywine, but said by Mr. Wright to ripen as early as the Thompson. An excellent shipper, very promising.

STRAWBERRY.

Brandywine (bisexual) (E. T. Ingram, West Chester, Pa.).—Originated in 1891. Size large; angular, conical, grooved, often compressed; stem moderately stout, hairy, calyx large, bright green, attractive in appearance, adhering firmly, depressed, without neck; apex sharp edged, pointed or grooved, uniformly ripened; surface irregular, rather rough, with slight gloss; color bright crimson, apparently perma-









ment; seeds irregular in arrangement, moderately depressed, very numerous, large, mostly dark straw color; flesh salmon color almost to the hollow center, compact, very firm, very juicy, with excellent shipping qualities; flavor brisk subacid, moderately rich; aroma fragrant, abundant; quality very good for canning. Season about June 10 in Chester County, Pa.

Glen Mary (bisexual) (E. T. Ingram, West Chester, Pa.).—Medium to large; roundish conical, often truncated, irregular, compressed; stem rather slender, quite smooth; calyx medium, dull grayish green, moderately adherent, with tendency toward necking; apex often depressed, truncated or irregular, sometimes green at tip; surface somewhat irregular, not much grooved, somewhat glossy; color dark crimson, fading quickly; seeds medium to large, rather numerous, irregularly placed, with little or no depression, crimson or straw color; flesh light salmon with a lighter circle around the hollow center, soft, rather watery, very juicy, shipping quality poor; flavor mild subacid to sweet, rather insipid; aroma not marked; quality not better than Bubach or Crescent. Season about June 10.

Iowa Beauty (bisexual)—(grounds of the Department of Agriculture) (Plate III).—Size medium to large, uniform; form varying from cylindrical truncated to round conical, blunt, regular; color brilliant, dark scarlet; seeds large, yellow; flesh dark red, moderately firm; flavor mild subacid, rich, vinous, sprightly; quality very good to best. Season about with Crescent, though the fruit ripens during a longer period; productiveness above medium.

SEMITROPICAL FRUITS.

KAKI.

Watt (Old Naval Observatory, Washington, D. C.).—Size medium, $2\frac{1}{2}$ by $2\frac{1}{2}$ inches; roundish oblate, with apex slightly depressed; surface smooth; color bright orange, changing to dark orange when fully ripe, and covered with light thin bloom; flesh orange yellow, soft, practically seedless; flavor sweet, slightly astringent until fully ripe; quality good; tree a moderately strong grower. Season late autumn.

The original tree was grown from seed brought from Japan by an officer of the United States Navy, planted in the garden of the Naval Observatory in 1873 by Mr. James Watt, who was then in charge of the Observatory garden and grounds. Mr. Watt states that Kaki seeds came to him in seven packages marked with different varietal names, now lost. They were planted separately and the resulting trees were distributed to several different parties; one tree of each lot being retained in the Observatory garden. The trees commenced fruiting at five years of age (1878) and bore annual crops until 1881, when but one survived the severe winter. This tree, which is here named "Watt," in honor of its originator, sprouted from the root and began fruiting again in 1884; it has borne annual crops since. It was injured somewhat by the winter of 1892-93 but matured numerous specimens of fruit in 1893, and in 1894 ripened at least 200 fruits. It is somewhat protected on the north and west sides by an althea hedge and a large quince bush, but has no other protection. It is in the form of a large bush, 7 to 10 feet high, having three main trunks each $2\frac{1}{2}$ to 3 inches in diameter.

ORANGE.

Lamb Summer (R. W. Pierce, Sunset Hill, Fla.).—A roundish, oblong fruit; size medium; color dark orange; rind thin, tough; flesh light-amber yellow, compact, heavy; tissue very thin; core small, slightly open; juice medium in quantity; acidity not marked; sweetness medium; aroma faint; quality good, but not equal to Hart Late. Season late spring and early summer.

Neve Late (E. Neve, Tampa, Fla.).—Obtained as a bud from either Jamaica or Cuba, about ten years ago. Fruit slightly obovate; size below medium; color reddish yellow; rind very thin and tough, slightly bitter; flesh reddish yel-

low, compact, with small vesicles; tissue quite tough; core small, compact; acidity moderate, pleasant; sweetness marked; aroma marked and pleasant, very good. Season April and early May. Very productive, producing its fruit in clusters of from five to seven.

POMELO.

Marsh Seedless (C. M. Marsh, Lakeland, Fla.).—Size large; form roundish, very slightly necked at base; stem small; surface moderately smooth; color lemon yellow; oil cells minute, indented; weight heavy; rind thin, one-sixteenth to one-eighth inch, quite free; segments 12, irregular; flesh light grayish green, tender; vesicles small, irregularly placed; tissue thin, translucent; core three-fourths inch in diameter, spongy; juice abundant, transparent; acidity, sweetness, and bouquet medium; bitterness marked; seeds very few (only 6 in large fruit), large, plump, whitish—a few abortive. Season February and March.

Orange Pomelo (A. L. Duncan, Dunedin, Fla.).—A chance hybrid between orange and pomelo. Size large; roundish oblate; stem set in slight and regular depression; apex short, blunt, even with surface; surface smooth, slightly irregular; color light orange yellow; oil cells large, distinct, prominent; weight medium; rind medium, closely adherent; segments 13, slightly irregular; flesh yellow, translucent, very tender, with moderately large vesicles, quite compact; tissue moderately thick; core large, closed; juice yellowish, abundant; flavor mild acid with the sweetness and bouquet characteristic of the orange; bitterness very slight. Season February and March.

NUTS.

CHESTNUT.

Black (J. W. Kerr, Denton, Md.).—One of Mr. Kerr's seedlings of the Japanese type, named in honor of Dr. John J. Black, a former president of the Peninsula Horticultural Society. Size large; kernel plump, surrounded by a rather thick and somewhat acrid skin; quality good for roasting. Season very early, September 10 to 20 in Caroline County, Md. Mr. Kerr states that the variety is very productive. Burs received from him contained from two to six perfect nuts each.

Killen (J. W. Killen, Felton, Del.).—A seedling of the Japanese type. This is a remarkably large and handsome chestnut, as large in size as the largest Japan Mammoth and in quality superior to most of this type. Yields three nuts to the bur.

BLACK WALNUT.

Thomas (James W. Thomas & Sons, King of Prussia, Pa.).—Has been propagated by grafting and disseminated to a considerable extent. It is one of the largest nuts in the Division collection; form oblate, compressed, slightly pointed at base, considerably so at apex; shell medium to thin; cracking qualities medium; the kernel not easily removed in perfect halves from the shell; flavor sweet, rich; quality good to very good.

PERSIAN WALNUT.

Drew (William P. Corsa, Milford, Del.).—Size of nut above medium; form oblate, with roundish base and compressed apex; surface moderately smooth, yellowish; shell quite thin; cracking qualities excellent; kernel short, thick, plump, light yellow; meat yellowish white; flavor sweet, rich, slightly astringent; good to very good. The nuts are self-hulling and ripen with or without frost about October 1. A seedling grown from a nut, probably imported, planted about 1875, by Andrew Corsa, and by him given, when one year old, to his brother, on whose farm in Sussex County, Del., the original tree now stands. It was twice transplanted, and being injured while young, by sun scald of the trunk, was cut back to the ground line when

6 years old. A sprout from the stump was protected from the sun's rays by two boards nailed together at their edges, placed on its southeast and southwest sides and left until the tree made top enough to shade its trunk. Since then no protection has been needed. The tree remains dormant until late in May, the blossoms thus escaping injury by frost. It commenced bearing in 1890 and has yielded an increased quantity each year since.

PECAN.

San Saba, synonym *Royal* (E. E. Risien, San Saba, Tex.).—Size medium; cylindrical, compressed near apex; weight about one-fifth ounce; base roundish, slightly conical; apex obtuse conical, compressed on two sides; surface quite regular; color light yellowish, striped and spattered with purple from the hull; shell moderately thin, quite firm; cracking qualities very good; kernel very plump, light yellow, with yellowish-white meat; flavor sweet, rich, pleasant; quality very good. (Mentioned in Report of Pomologist for 1891).

The original tree stands near the junction of the San Saba and Colorado rivers, and has been under observation for many years. It is reported to bear annual crops. Mr. Risien has propagated the variety by top working large native pecan trees and by root grafting small seedlings. He finds the former process preferable.

SHAGBARK.

Dover (Andrew Stough, Dover, Pa.).—Size medium or below medium; quite angular, broader at the base than toward apex, with a distinguishing long and sharp point at the base; color dull yellowish; shell moderately thin; cracking qualities medium; quality moderately good, with slight astringency.

CULTIVATION OF THE ORCHARD.

If orchards are to be made profitable they must receive as good care as any other part of the farm, and the three essentials are cultivation, fertilization, and spraying.

CULTIVATION.

Cultivation has for its object the furnishing of food to the plant and the conserving of moisture in the soil. It should begin as soon in the spring as the ground is sufficiently dry, and be repeated at intervals of a week or ten days until July or August, or about the time the trees have finished the season's growth. Where the trees are young the first plowing should be rather deeper than the others, in order to send the roots deep into the soil. Frequent shallow working in the spring and summer not only puts the soil in a finely pulverized condition favorable to the ready giving up of plant food, but also, by forming a mulch of loose soil, greatly aids the retention of moisture during the hot, dry weather of summer. Fall plowing is not advisable in orchards, as a compact soil protects the roots during the cold season better than a loose one. The culture should be level or nearly so, and to that end the plowing of each year should be at right angles to that of the preceding year and the soil near the trunks of the trees should be stirred at each cultivation.

As a general rule orchards should not be sown to grass or grain, but sometimes a strong, thrifty apple or pear orchard may be thrown into bearing by being allowed to set a sod for a year or so; yet even then no hay must be cut, but hogs and sheep may be pastured in it advantageously.

While the orchard is young and not bearing fruit hoed crops may be used if an open space is left about each tree and such crops selected as will least interfere with the healthy growth of the trees and the thorough maturity of the wood before the approach of winter. But it must be remembered that this makes a double drain upon the fertility and an extra demand upon the moisture of the soil; in case there is not sufficient of either for both trees and crops, it is false economy to secure a crop at the expense of the young trees.

It is a mistake frequently made by many farmers and fruit growers to demand of the orchard that it shall take its place as one of the fields in the ordinary farm rotation, and the sooner they realize that the orchard is a place set aside for the growth of trees and fruit, and nothing else, the sooner will fruit culture become profitable. To expect from the soil a normal growth of wood, an annual crop of fruit, and an ordinary field crop the same season is the height of horticultural folly, as no soil can be made to produce all three profitably.

If the orchard is cultivated as an orchard, and the soil fertilized with a view to producing, in proper proportions, wood and fruit, it will become the most profitable portion of the farm.

If the actual practice among farmers were more in line with the plan thus briefly outlined many orchards that do not now pay interest upon the original investment would soon become profitable and we would hear less about fruit raising being a ruinous occupation.

FERTILIZATION.

While cultivation is in a certain sense fertilization, there are very few orchards that could not be benefited by adding to the natural fertility of the soil.

Of the three essential constituents of plant food—nitrogen, phosphoric acid, and potash—nitrogen is of the greatest value in developing growth and forming wood. The orchardist would have an abundant supply of this element if he knew how to operate his barnyard economically. Barnyard manure is rich in nitrogen and is admirably adapted to the development of wood, and while the orchard is young should be applied liberally, not only for this purpose, but also for fertilizing such annual crops as may be grown with the greatest profit—depending upon the home market or facilities for shipment.

Applications of barnyard manure should be made early in the season, in order that the wood may have thoroughly matured by the time of freezing weather, or late in the season as a top-dressing, so that the

available portion may be carried by rains and melting snows into the soil ready for use the following season. When the trees have reached a fruiting age, phosphoric acid and potash are necessary for the development and maturity of fruit.

These constituents are essential to the maturity of the crops that are grown in the orchard in its earlier years, but when the trees have reached a bearing age, if these crops be continued, there must be a liberal application in addition to what has been applied for annual crop purposes.

In my own orchard I have grown for a series of years a crop of potatoes averaging 200 bushels per acre from the portion of land that can profitably be utilized for that purpose, and have not failed to have a plentiful crop of apples annually since the trees have reached a bearing age.

SPRAYING—PROFITS.

The subject of spraying fruit trees as a means of destroying insects and preventing the attacks of fungi, as well as a consideration of the profits of this work, properly comes within the province of other divisions in the Department. In view of the importance of the subject, however, and the interest taken in all questions relating to profits, it can not be out of place in a consideration of the subject of the cultivation of the orchard to call attention to a few instances bearing upon this matter.

Mr. Calvin Cooper, Bird in Hand, Pa., ex-president of the State Horticultural Association and a member of the State board of agriculture, reports as follows:

I desire to say that three sprayings given the trees result in great benefit. The foliage and fruit remain on the trees much later in the season, enabling us to delay the picking nearly one month, thus giving us cooler weather and lessening the rot, etc., which result when they ripen too soon.

On two Rambo trees, from which the apples prior to this year had always dropped, spraying retarded the ripening also, so that at picking time many of the spurs would break off with the fruit.

On our Rome (Beauty) trees, on which we had quite a deal of scab, two sprayings of bordeaux mixture with an insecticide applied at the same time gave us an elegant crop of the most perfect fruit which kept all the winter. Other varieties of apples showed similar good results.

On pear trees a single application about midsummer on a tree affected with leaf blight not only checked the disease, but spraying half a tree adjoining it heavily laden with fruit (variety Anjou), so retarded the dropping of the leaves on the half of the tree that was sprayed that we had extra choice fruit, while on the other half the foliage dropped early and the fruit was only ordinarily good.

A large Lawrence pear tree, with the bark completely browned on the trunk for about 5 feet and the branches apparently dead for 2 feet from the trunk, was sprayed last fall (1893) with bordeaux mixture until it ran down the trunk to the ground, and early this spring the dose was repeated. It had good, healthy foliage all summer and ripened a few pears. It seems to have made growth nearly all around the diseased part from the green bark below to that above, and formed new healthy bark, thus making a new connection. We find great good from the use of the sprayer.

Mr. Gabriel Hiester, Harrisburg, Pa., a member of the State board of agriculture, writes as follows:

In reply to your inquiry of the 26th I would say I commenced spraying my apple trees in 1889 for Codling Moth, and in 1891 for fungous diseases. Prior to 1889 I did not have any apples that would keep after December 1, as they were either wormy or otherwise disfigured. In 1889 I sprayed an orchard containing 440 trees with a solution containing one-fourth pound of paris green to a barrel of water. Cost per barrel, 8 cents, one barrel being sufficient for 20 trees; the total cost of material and labor was \$7.76. That year I picked 1,000 bushels of perfect apples that kept all winter, the last being sold in March and averaging \$1 per bushel for the entire lot. In 1891 I sprayed this orchard with bordeaux mixture once before the buds had burst, once with bordeaux mixture with one-fourth pound paris green added per barrel just after the blossoms had fallen, and twice afterward with ammoniacal copper carbonate solution. The cost of all this spraying was \$50.54 for the 440 trees. The result was 1,500 bushels of apples free from worm, scab, or mildew. The orchard has not failed to yield at least 1,000 bushels of first-class fruit each year since. The effect of the fungicides upon the quality of my pears was even more marked than on the apples.

I commenced spraying my grapes for black rot, mildew, and anthracnose in 1891. The vineyard contained about 2 acres of 1,500 vines. It required 400 barrels of bordeaux mixture and two days' time for each spraying. I sprayed with bordeaux mixture three times, with ammoniacal copper carbonate solution twice, at a total cost for material and labor of \$16.24.

The crop had been getting smaller each year, until in 1890, the year before I commenced spraying, I cut less than 2 tons, which sold for \$150. In 1891 the yield was 9½ tons, and sold for \$635, giving a gain in the first year of \$485. In three years' time I had entirely stamped out every vestige of rot and mildew.

The following figures, taken from the report of the New York Agricultural Experiment Station for 1893, page 697, show prices realized for different grades of sprayed and unsprayed pears:

Varieties.		Sprayed.	Unsprayed.
Seckels:			
Firsts	per bushel ..	\$2.25 to \$2.75	\$1.25 to \$1.75
Seconds	do.	1.75 to 2.00	1.00 to 1.30
White Doyenne:			
Firsts	{ per barrel ..	4.50
	{ per bushel ..	1.80
	{ per barrel ..	3.25	2.00
Seconds	{ per bushel ..	1.30	.80

Gain per tree from spraying: Seckels, \$4.80 to \$5.77; White Doyenne, \$6.10.

In this case the trees had been given five applications of bordeaux mixture to prevent pear scale. The cost of material and application was 47.6 cents per tree for five sprayings, and 55.3 cents for six applications.

For additional information see Bulletin No. 3, Division of Vegetable Pathology, pp. 68-70; Farmers' Bulletin No. 7, p. 11; Annual Report of the Chief of the Division of Vegetable Pathology for 1890, pp. 400, 401; Journal of Mycology, Vol. V, pp. 204-209; Bulletin No. 7, Division of Vegetable Pathology, pp. 26-31; Journal of Mycology, Vol. 7, No. 4, p. 338.

IMMUNITY FROM SCALE INSECTS.

Pears of Chinese or Japanese origin, and at least one cross, the Kieffer, have in several cases been free from the attacks of the San Jose scale, while pears of European or American origin have been almost entirely destroyed. Dr. C. H. Hedges, of Charlottesville, Va., upon whose place experiments have been conducted for the extermination of the San Jose scale, writes to this division December 5, 1894:

Your entomological division is pretty well acquainted with the operations of the San Jose scale here, but I would say now, in corroboration of my remarks to you during your visit on the exemption so far of the Kieffer, that a day or two after you left here, upon examining a row of Boses, I found all infested, and two or three very badly, some branches being entirely covered. These trees are in my Kieffer orchard, first row, and only 20 feet distant, all the trees being 20 feet apart. I examined carefully the adjoining Kieffer rows and found not a scale.

The exemption of my single Mikado pear tree is most interesting. One limb of it rested on a thoroughly infested Duchess, which I destroyed in the fall, without any attachment of the scale insect. The tree now is perfectly healthy and vigorous.

John B. Smith, entomologist of the New Jersey Experiment Station reports:

Kieffers alone are absolutely exempt, and closely following comes the Le Conte, which is rarely infested in the nursery and never in my experience in the orchard.

One tree grafted with Lawson and Kieffer had the Lawson branch and fruit covered with scales, while the Kieffer branch was entirely free.

In not a single case have I found scales in the Kieffer orchard, though in the nursery a larva will occasionally get upon a fruit and fix, only to be forced out before it is half grown. (*Insect Life*, vol. 7, No. 2, p. 166.)

These investigations possibly indicate a plan by which we may eventually produce a class of pears that will resist the ravages of this most troublesome scale. The Kieffer is undoubtedly of oriental parentage on either the pistillate or staminate side. From the pure Japanese pears now grown in this country it is probable that seedlings or crosses could be produced much better in quality than any of that class grown at present.

By persistent trial in this direction throughout the entire pear-growing section we may reasonably expect varieties comparing favorably with the choicest pears in cultivation.

IMPROVEMENT OF STRAINS.

It is a well-known fact that certain varieties of fruits are subject to influences resulting in modifications more or less valuable. For want of a better term these new forms have been called strains. Upon the line of improvement of fruits through selection of strains but little practical work has been done, and it is desirable that the attention of nurserymen and others be directed to the importance of propagating from their best strains, thereby improving the quality of fruits in the

same manner that the stock breeder has improved breeds of domestic animals.

Without attempting to wholly explain the cause of this variation, it may be stated that much of it is due to bud variation, and this may be perpetuated intentionally or otherwise by the removal of scions for propagation. Reversion is also another factor in causing varieties to differ, the fruit assuming characters more nearly approaching one of its ancestors.

Among some varieties of pears, apples, plums, etc., there seems to be a constant weakness in regard to self-pollination. Certain varieties bloom profusely and have abundance of pollen, yet fail to set sufficient fruit to make their cultivation profitable. In the case of pears this subject has been extensively investigated and a report given¹ which shows that this unfavorable fact can be overcome by top working some of the branches with varieties whose pollen is known to be potent, and thus varieties of excellent quality that are usually poor producers may be rendered more profitable.

Among apples an instance of lack of potency of pollen may be given: The Smokehouse, while a profuse bloomer, is generally a poor bearer. A tree of this variety that came under the author's observation for many years never bore abundantly, although the tree was about 25 years old. Later, trees of Fallawater and Red Astrachan were planted near by, and since they have become old enough to bloom profusely the older tree has borne abundantly.

It is well known that the Wild Goose plum is rendered more productive by top working with certain varieties possessing more pollen. In California and Oregon it is said that in order to render almond culture profitable more than one variety must be planted in an orchard.

The influence of foreign pollen has been shown to have a marked effect upon the shape of pears, and it has been shown¹ that by the selection of a variety for top grafting this fact can be controlled within certain limits. There are on record well-defined strains of apples, among which may be mentioned two or three of the Baldwin, which no doubt originated from a common source. One, a remarkably late keeper, is commonly designated as the Winter Baldwin. The same is true of the Smokehouse; one, on account of its keeping qualities, being called Winter Smokehouse. Two varieties are known of York Imperial, one being of a deeper yellow-colored flesh and of better quality than the other. There are two strains of Newtown Pippin, and at least two distinct strains of Ben Davis. In Pennsylvania in one locality there are at least five distinct strains of Rambo, known as the Red, White, Sweet, Blue, and Winter Rambo. These seem to be distinct varieties, the trees producing them year after year and maintain-

¹U. S. Department of Agriculture, Division of Vegetable Pathology, Bulletin No. 5,

ing their distinctive characteristics. The winter variety keeps in fine condition at least two months longer than any of the others.

The following are some well-established instances of bud variation: In the orchard of Mr. J. G. Brown, Rising Sun, Del., are several trees of Red Astrachan the fruit of which is distinctly striped, and it is sold as Striped Astrachan. The trees in habit of growth bear a striking resemblance to each other and differ from that of the ordinary Red Astrachan. In the author's orchard an apple was taken from a Red Astrachan tree during the past season that was striped and quite unlike the type in form, and was only recognized by its flavor. In the same orchard two apples were taken from a tree of Cornell Fancy so dissimilar, that no expert would have decided them to be of the same variety. From Illinois an instance is reported of apples that greatly resembled the Rambo having been found on a tree of Willowtwig.¹ From California specimens of Winesaps have been received from a single tree, one of which was distinctly striped, the other unicolored.

The Division of Pomology desires the cooperation of growers of varieties of fruit, and asks that specimens may be sent of differentiated varieties growing under similar conditions, with reliable data relating to them. It is believed that as great improvement is possible along the line of selection of strains as by the endless multiplicity of new varieties, the great majority of which are not equal in value to those already under cultivation.

¹ American Horticultural Society Rpt., Vol. V, pp. 207, 208.

NUT CULTURE.

By H. M. ENGLE, *Pennsylvania.*

When the extent of territory in the United States capable of growing all kinds of edible nuts is considered, there seems to be no reason for importing hundreds of thousands or maybe millions of dollars' worth annually. It is also strange that while so much money is lying idle and so many unemployed voices are clamoring for work this profitable industry remains undeveloped.

Reliable reports of the value of nuts produced from single trees or from small areas should be sufficient to induce capitalists to invest in nut culture as a paying business; and since agriculture has been less profitable of late than formerly, these reports of success should induce farmers to plant nut-bearing trees, which might in a few years pay better than any other similar area of the farm.

Of course all kinds of nuts will not grow in all kinds of soil, but most soils will produce some kind of nuts.

The food value of nuts should be taken into consideration as well as the pecuniary interest. In this country nuts have hitherto been used principally as a luxury, but the time seems not far distant when some kinds at least will be grown as food, many of which are more palatable and nutritious than some foods in general use.

In importance I would enumerate nuts in the following order, viz: Chestnut, pecan, English walnut, shellbark, black walnut. The native chestnut, shellbark, and black walnut are perfectly hardy, while among the foreign chestnuts, pecans, and English walnuts there are some varieties that are not hardy.

Among chestnuts the native American is not excelled, although it generally lacks size when compared with some of the foreign varieties.

Spanish and other chestnuts have been grown in this country for many years, and the general impression is that all large chestnuts are of inferior quality; but this mistaken impression will, no doubt, be dispelled ere long, since there are several varieties which are nearly if not fully equal in quality to the native nuts; for instance, Paragon, Numbo, Ridgeley, and some of the newer seedlings, are said to be greatly improved in quality, probably by the influence of native pollen, which in many instances is carried long distances by insects or winds.

CHESTNUT CULTURE AND ITS DRAWBACKS.

Chestnuts can be grown in a variety of soils, but flourish best on light, rolling, or hilly lands. In fact, they are indigenous to rocky or mountainous regions.

The latest advance in chestnut culture is to cut away chestnut forests and graft improved varieties on the sprouts, keeping down all growths of the original stump except those grafted, which should stand at such distances as not to crowd when the trees shall have grown to their full size. It can scarcely be credited, except by those who have seen, how early and profusely they will bear when thus treated. To the forestry advocates I would say that this method of propagation is not deforesting, but reforesting by advanced ideas. The experience of the writer has thus far been with Paragon, and has been quite satisfactory, the trees grafted on sprouts bearing much younger than was expected. The only drawback thus far has been the chestnut weevil, which does considerable damage some seasons. There are evidently three different weevils which injure the nuts: First, the common larva, which is about three-eighths to one-half inch long, with generally but one in a nut; second, a larva similar to the first, but only about one-fourth as large, with from six to ten in a nut. These both evidently grow in the nut, as we see no mark of their entrance; the eggs must therefore be deposited in the nut when young. The larva of the third resembles closely that of the codling moth, being of a purplish color, and is rarely found in the nut, but seems to operate from the outside, and seldom spoils the nut altogether—in fact, in many cases barely destroys a portion of the shell of the nut. The latter is not so destructive as the former two, and I believe can be destroyed by spraying in the same manner that apples, pears, etc., are treated. I am inclined to believe that it is similar to the apple curculio, which is very destructive in some apple orchards, causing apples to become more gnarled than wormy.

NOTES ON NATIVE AND FOREIGN NUTS.

Pecans have thus far been confined principally to southern latitudes, where also the finest are grown. It is said not to be hardy in northern latitudes, although some are grown as far north as Illinois, where nuts of fine quality are produced. No doubt, by growing seedlings, choice and hardy varieties will be forthcoming, as has been the case with fruits generally.

English walnuts (perhaps not of English origin, nevertheless they generally pass by that name) are pretty generally grown, and considering the excellent hardy ones it seems strange that they are not more extensively grown, since they succeed so well over so large an extent of territory and on so great a variety of soils, although they flourish best in those of a rich nature.

The new and improved Japan varieties should give this branch of nut culture fresh impetus.

The *shellbark*, the kernel of which is scarcely second to that of any nut grown, owing to the difficulty of transplanting and grafting, has not received the attention it would have received could it be more easily propagated. However, the impetus which nut growing has received will no doubt bring it into more prominence.

The *black walnut* has perhaps received the least attention of any nut, that is, for the nut product, but it is no doubt susceptible of the same degree of improvements as are the other varieties of nuts. Wherever its planting has been extended it has been more on account of the wood than of the nuts, although the traffic in black walnuts is by no means insignificant.

Of the nut-bearing trees mentioned in this paper there is none of which the timber is so valuable as that of the walnut. Of late years the old black walnut trees, from which for half a century or more the nuts have been carefully gathered by boys and stored for winter, have succumbed to the woodman's ax, or rather saw, and much of the lumber has been exported to Europe.

It is time that planting should be made, to replace the wholesale destruction of this beautiful tree yearly taking place.

The *white walnut* (butternut) should not be despised or neglected, although not of as much value as those referred to. It may also be improved in the quality of its fruit by proper selection.

In the still further improvement in nut culture the primary objects should be to obtain size, quality, productiveness, and hardness, and, in addition, I would emphasize, "*aim at more kernel and less shell.*"

It should not be more difficult to obtain this end than for stockmen to breed out bone and add muscle in swine and cattle, or for dog fanciers to breed tails off from dogs.

We have thus briefly described, under their popular names, the most common and widely distributed varieties of native and other nuts adapted to general culture, and we earnestly hope that experiments with the same may be begun wherever they will flourish. We may, at the same time we are cultivating trees for their fruit, point out in an humble way the means by which profitable and useful trees may be restored to sections from which fire and the ruthless hand of man have thoroughly removed them.

CHESTNUT ORCHARD OF H. M. ENGLE, YORK COUNTY, PA.

On Saturday, September 29, 1894, at the request of Mr. Henry M. Engle, the Pomologist visited his chestnut orchard in York County, Pa.

Mr. Engle had urged the necessity for such a visit, stating that his object was to convince the fruit growers of the United States through the report of the Division of Pomology that we ought to produce all the

chestnuts consumed in the United States, and thus save the amount annually expended for foreign chestnuts.

It was found that he had 25 acres grafted; 5 acres grafted one year, 5 acres grafted two years, and the same number of acres per year, his oldest grafting being five years.

The land rises with a very steep grade from the Susquehanna River, is very much broken, rough, and rocky, and has never been plowed.

In some portions the native chestnut trees appear to have grown upon sections entirely covered with stones.

The only evidence of cultivation was the cutting of paths through portions of the orchard by means of the scythe. All other portions of the ground were overgrown with whortleberry, raspberry, blackberry, and other bushes.

Trees grafted one year of course had not yet fruited. Trees grafted two years had as high as 35 burs, averaging three chestnuts per bur. Trees grafted four years had upward of 400 burs, and those grafted five years had upward of 500 burs by actual count.

The pomologist was accompanied on this visit by several gentlemen, who counted and reported to him the crop of quite a number of trees of different ages, and the above is an average of their investigation. Mr. Engle was requested to incorporate the results of our observations in a paper that he had promised to prepare upon nut culture, but since they did not appear therein it is deemed proper that such notes should become part of this paper.

I am satisfied that there are tens of thousands of acres of native chestnut land in many of our States that might be treated in the same manner.

Land unfit for any other form of cultivation might in a few years become very profitable and the ratio of woodland to cleared land remain undisturbed.

PRUNE CULTURE IN THE PACIFIC NORTHWEST.

By E. R. LAKE, *Oregon.*

Prune culture in the Pacific Northwest is comparatively a new industry. The prune, though grown here since pioneer days in the fifties, has only within the past decade become a fruit of commercial importance in this section. For twenty years or more following its introduction it had no rank as a commercial crop. Since the early eighties, however, it has been put upon the market in noticeable quantities, and since 1890 it has become of considerable value. The income from the output this year is probably not far from \$250,000. Next year the output will be much heavier, and it promises to steadily increase year by year until the large number of young orchards, covering a wide area and now just under bearing age, come into full bearing.

Last July the Rural Northwest, a very conservative authority, in speaking of the importance of the industry to this section, after reviewing over five hundred very full reports, said:

It appears from the reports which have been made to this paper that there are now about 40,000 acres of prune orchards in the three States [Oregon, Washington, and Idaho]. The investment already made in this industry can not fall far short of \$6,000,000, and by the time all these orchards have come into bearing the amount of the investment will have reached \$10,000,000. The cost of the evaporators needed to cure the prunes grown on this acreage will not be less than \$2,000,000, and \$500,000 more will be required to buy the graders which must be used before and after curing the fruit. This makes a total investment of at least \$12,500,000 before the present area of orchards will be fully equipped. In the meantime the area of young plantings is being largely increased, and it is not unsafe to say that \$20,000,000 will be invested in this industry by the close of 1899.

In the single planting season of 1888-89 more acres were set out to prunes than had been put out altogether from the date of introduction till that time.

The explanation of this sudden development of the prune industry lies chiefly in the facts that our soil and climate are particularly favorable to the development of this fruit, and that prices have been such as to make it exceedingly profitable. As high as 18 cents per pound have been netted for small quantities of prunes, and not infrequently carload lots have netted the growers 10 cents, 11 cents, and 12 cents per pound. But during the past year prices have fallen to as low as

4 cents, though the general crop has been sold for 5 cents or more; and even at these prices, with best modern methods and good management in both orchard and evaporator, this is a profitable crop.

The first commercial prune orchards of this section were planted near Portland, Oreg., and Vancouver, Wash., two cities lying only 6 miles apart, but on opposite sides of the beautiful Columbia. Vancouver is located in Clarke County, and this is the center of prune culture in Washington. Douglas County is the banner county for prunes in Oregon, though Yamhill is a close second. Wallawalla Valley has a large area of young orchards and will in the near future market large quantities of this fruit.

While the sections above enumerated are the leading centers of the industry at present, there are several other points at which it is becoming important. In Oregon, Ashland, Grants Pass, Eugene, Corvallis, Salem, Oregon City, and Milton are the local centers of large plantings which will begin bearing next year, as well as of some that are already bearing. In Washington, Olympia, San Juan Island, Yakima, and the Snake River Canyon are other points at which young bearing orchards are to be found.

At all these points the soil and climatic conditions are peculiarly suited to the growth of the prune. Western Oregon and Washington have a uniformly fertile soil. It is largely basaltic loam, resembling in appearance the soil of the "oak openings" and prairies of southern Michigan and parts of Indiana. In southern Oregon much of the soil is of granitic origin, the surface soil in many places being composed of irregular, broken, half-decomposed particles of granite. In parts of this general territory west of the Cascade Mountains the basalt is so deep as to make it necessary to underdrain, while in much larger parts abundant drainage is furnished through a gravelly subsoil. Along the foothills and on the ridges skirting the numerous small valleys much of the soil is a red clay, and is admirable orchard land. The shot clays (soils made up of small reddish brown or black clay pellets) of some sections are held in high esteem for prunes.

In the eastern part of both States the soil is very variable, ranging from light drifting sands to heavy clays. An intermediate soil, locally called volcanic ash, is a favorite one for prune growing. Usually, however, orchards in the eastern part of these States must be irrigated, which is also the case in Idaho.

Commercially we have three prunes: Italian, Petite (Prune of Agen), and Silver (Coe Golden Drop). Other varieties, and there are several being tested and cultivated in small quantities, are classed with one of the three above according to size and color. Black ones, if large, are classed with Italian; rosy ones, with Petite; light-colored ones, if large, with Silver. Prunes which do not naturally fall into one or another of these classes are not readily salable. The Italian is the first choice in this section, though the Petite is a more regular and prolific bearer.

The peculiar plum flavor of the Italian, coupled with its large size, secures for it a ready sale at $12\frac{1}{2}$ cents per pound for the dried product—higher than the Petite; hence it is a more desirable prune for growing in this section, though the Willamette, a new prune here, appears on first test to have all the desirable qualities of the Italian besides a few of its own. The Petite is the leading prune of California; hence with the Italian we do not come into competition with our neighbor, a point of some importance in the consideration of varieties for planting here.

In the matter of selecting orchard sites much latitude is allowed individual taste. If care is used and a site selected where the soil is deep and well drained, little difficulty will be experienced in growing a good prune orchard in any of the sections above mentioned. Since all our prunes are propagated on peach stock, and as this stock is averse to wet, heavy soils, it is necessary to look carefully to the drainage, surface, and subsoil of the orchard site. Usually hill land is preferred, though river bars, ridges of red soil, and high "fern land" are equally acceptable if the latter have good bottom drainage. While the more level valley and bottom land is not usually used for orchard purposes, it is, under proper treatment, excellent for this purpose. Some of the most vigorous and productive small orchards in this region are on low valley land, but it is thoroughly tilled.

For several years past our leading horticulturists have advised the most thorough preparation of the soil before planting. They have recommended deep surface plowing, subsoiling, tile draining, and, in truth, everything which would tend to put the soil in the best possible condition for the reception of the trees. But planters are slow to adopt thorough tillage measures, and, generally speaking, the ground is given an ordinary plowing and harrowing and the trees set out. Not infrequently, in the timbered sections, the trees are set out before the stumps of the forest monarchs are all removed. This practice can not be countenanced, as deep tillage before planting is of much importance.

The operation of planting is usually performed in the spring, though in open winters trees may be planted at any time from November 1 to April 1. Yearling trees are used altogether now, planters finding them cheaper, more easily handled, more suitable for uniformity in heading, and quicker to recover from the shock of transplanting. A first-class yearling prune tree—none other should be planted—will be from 7 to 10 feet in height, one single shoot, and five-eighths to $1\frac{1}{4}$ inches in diameter. After the tree is planted it should be cut back to within 18 to 30 inches from the ground (fig 1). This operation is called "heading back," and this practice determines the suitability of the one-year-old single shoots, for with such a tree the head can be started at any desired height.

In the older orchards trees were planted $16\frac{1}{2}$ feet apart each way—160 to the acre. Later plantings have been made 18 and 20 feet apart,

with much better results. A prune tree on anything but the thinnest of soil needs more than a "rod square." Nearly all plantings are made on squares, though a few orchards are planted on the quincunx plan.

Formerly trees were headed back to about 4 feet. At present they are commonly headed back to 2 feet, while 18 inches is not uncommon in the warmer and drier sections. The objections formerly urged against

low heading, to the effect that tillage operations could not be so well performed, have been met in the tillage of the younger orchards. A team properly handled will do no more damage to a tree headed low than to one headed high; the soil can be as fully and thoroughly tilled in an orchard of low tops as in one of high tops; pruning is much more easily performed; less damage is done fruit by bruising in the fall to the ground, and with fruit to be shipped to distant markets in fresh condition the saving over the cost in picking from high tops is a considerable item.

The first year after transplanting the young tree is allowed to push out three or four branches, care being exercised that they do not issue from a common point on the trunk. These shoots are cut back one-half or two-thirds during the following winter. The second year each one of these branches is allowed to push out from two to four shoots. At the next pruning these are thinned out and cut back to correspond with the style of tree to be grown and the extent of growth made. The winter following the third growing season will witness a repetition of the pruning operations of the previous year. The fourth year some fruit may be produced, and from this time on less annual pruning is required until in the seventh or eighth year little else than thinning out injured, crossed, or intractable branches will be needed. (Fig. 2.)

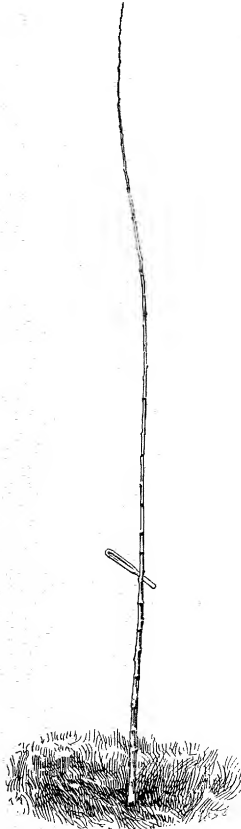


FIG. 1.—Yearling prune tree with knife inserted at point at which it should be cut back—18 to 20 inches from the ground.

Clean cultivation is the universal practice in all young orchards and many old ones. One crop at a time is the motto of the prune grower. In the spring one principal plowing to the depth of 5 or 6 inches is given, and usually this is followed by a cross plowing of somewhat less depth. From the time this work is finished till the middle of July harrows or cultivators are kept constantly working over the surface soil. In orchards where ferns infest the land one of several devices called "fern killers" is drawn over the ground as often as the young ferns show above the surface. This constant stirring of the soil conserves the moisture to such an extent that trees are kept vigorously

growing through our longest dry seasons. Without such working the active growing season of the trees is shortened; they begin in consequence to bear earlier, and this is followed often by the early breaking down of the tree's constitution.

All over our prune-growing sections may be seen examples of this early neglect of thorough tillage, in orchards now old and broken-down which should still be in their prime. Still many of our small home makers grow annual vegetables and strawberries among the trees for the first

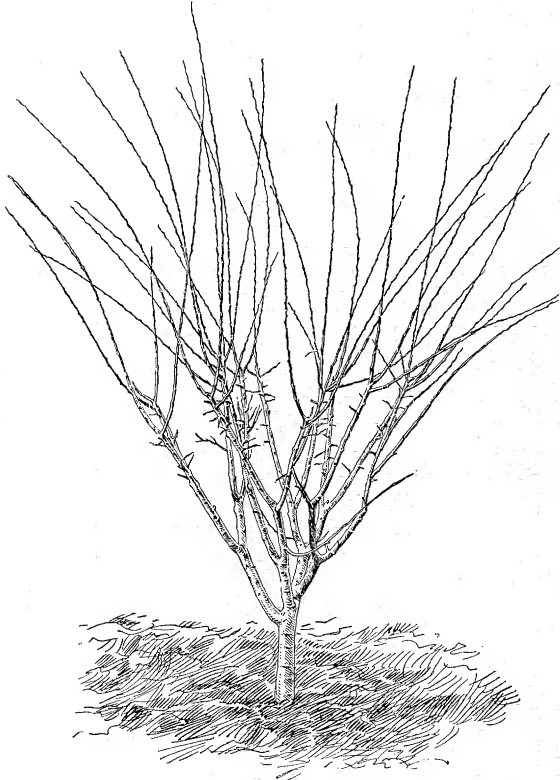


FIG. 2.—A model prune tree of the vase form.

four years, and when good judgment is used in the tillage of such crops little if any check is given to the trees. But the growing of bush fruits, raspberries and blackberries in particular, does serious injury in a young orchard by checking and stunting the growth of the trees. The same may be said of the fern; if allowed to grow quite unmolested it works havoc to the trees. An instance in mind gives the plainest possible evidence that five-year-old trees among a dense growth of fern have made less growth than three-year-old trees in similar soil and under similar treatment with the fern removed. The explanation is easy. These bush fruits and the fern take all the moisture from the soil just when the trees most need it, and the result is a premature

ripening of the wood of the trees and a cessation of growth before the season is much more than half gone. Another reason why the prune orchard should be clean tilled is that it facilitates the picking up of the fruit.

For drying the prune should be fully ripe. The riper it is without being rotten the better. With the process of ripening comes the formation of fruit sugar, the especial element desired in this product. As soon as the fruit begins to leave the stem freely and fall to the ground the evaporators are started. Boys are usually employed to pick up the fruit and are paid at the rate of 5 cents per bushel. None but fully ripened fruit is permitted to be gathered. The boys are not allowed to shake the trees, though a light shake or jar is sometimes given by a person assigned to this particular task. Green or partly ripened fruit makes a very inferior—in fact, a nonmarketable product—and it is to avoid this loss that great care is exercised in gathering only fully ripened fruit. Some orchardists allow the fruit to lie on the ground several days after it has fallen or been shaken off before gathering it, holding that this mellows and “sugars” the fruit; certain it is this fully ripened or even overripened fruit always gives the best returns in the dried product. Boxes holding from 50 to 60 pounds are used exclusively for the gathering up of the fruit.

Upon delivery at the evaporator, the fruit is passed over a grader, which separates it into four or five grades and at the same time removes all leaves and other rubbish. From the grader the fruit is placed in bins, each grade separately, where it may be allowed to remain one or two days in which to further mature or mellow. When ready for evaporation the fruit is taken from the bins in baskets or pails (holding about one-third or one-fourth of a bushel, and made of some perforated metal or wire) and “dipped,” rinsed, placed upon trays, and put into the evaporating chamber.

There is a diversity of practice in the matter of “dipping.” Some of our growers dip Italian and not Petite, others practice the reverse, while still others dip neither. Dipping consists in immersing the fruit for from one to three seconds in a boiling solution of lye. It is claimed by the advocates of dipping that the fruit dries more quickly and consequently the expense of evaporating is lessened; those who do not dip claim that the dried product from undipped fruit looks enough better to more than offset the extra expense in drying, being more marketable. However this may be, for as yet no adequate experiments have been made to ascertain the truth, it is certain that no brighter, rosier, livelier lot of evaporated fruit has ever gone to the market from this section than has been cured here this year without dipping.

As practiced here the dipping process is about as follows: A large caldron kettle, holding perhaps 60 gallons, half or two-thirds full of water, in which concentrated lye has been dissolved in the proportion

of 1 pound of lye to 12 gallons of water is put over the fire, the water brought to boiling point and kept there while the dipping progresses. A basketful of fruit is immersed in this solution, given a swirl, and removed. The object is to bring every part of the prune in contact with the hot lye water. If the work is thoroughly done the skin of the fruit will present, on removal, a blistered appearance, which is accompanied by numerous minute scratches. From the lye water the prunes are taken to tubs of pure, clean water, where the dipping is repeated, even more thoroughly than before, in order to rinse off all traces of lye from the fruit. Even if dipping is not practiced, this rinsing is just as necessary for the removal of dirt and other foreign matter that may adhere to the fruit. All fruit is therefore washed before going onto the trays. On being taken from this second bath the fruit is dumped on trays, spread uniformly, and the trays either tiered up in readiness for the evaporation chamber or put in at once. During these various steps in the process of evaporation the different grades of fruit, as determined by the grader, are kept separate—that is, only fruit of one size is placed upon a single tray. This allows of a uniformity in the evaporation of each tray, a very desirable condition. The point at which evaporation shall be stopped is one of great importance and at the same time one that is imperfectly understood. The essential point is to secure as “meaty” a product as possible and at the same time one that will not mold or sour when subjected to variable climatic conditions. Drying too hard not only greatly lessens the weight of the total product to the grower but it injures the quality, while drying it too little may result in great loss through fermentation and molding. A fruit that is just right will be, when cold from the evaporator, bright, elastic, yielding to the touch, and when stirred in bulk must “crawl.” This latter condition must be seen to be fully understood, as no word or words will better describe it than “crawl.”

The evaporator in most general use is one evolved out of the experience of the past decade, and, though far from perfect, has been the groundwork for some recently improved patented evaporators that are doing excellent work (Fig. 3).

The chief point aimed at in the old-style drier was to create a current of air which should pass through or over a large amount of fruit. To accomplish this, recourse was had to an arched brick furnace with double return flues placed several feet beneath the evaporating chamber, which is an ordinary closed room with numerous small doors opening into it, one above another in tiers, from the sides. Through these doors the fruit is introduced on trays, the tiers of trays being quite regularly distributed throughout the chamber or room on a series of cleated supports. For a current of air dependence has been placed on natural conditions—heated air rises. To increase the current one must increase the heat; but above 180° F., or thereabouts, it is injurious to the tex-

ture of the fruit. Under the present practice twenty to twenty-four hours is found to be the average period of time for drying. This is altogether too slow where great quantities are to be handled, and our foremost growers are looking to the introduction of some system of forced-air currents for quicker results. One improved evaporator permits the removing of cured fruit from any part of the chamber at any time and its replacement by green fruit. This is a great advance over the style in general use, which requires that the fresh fruit be placed

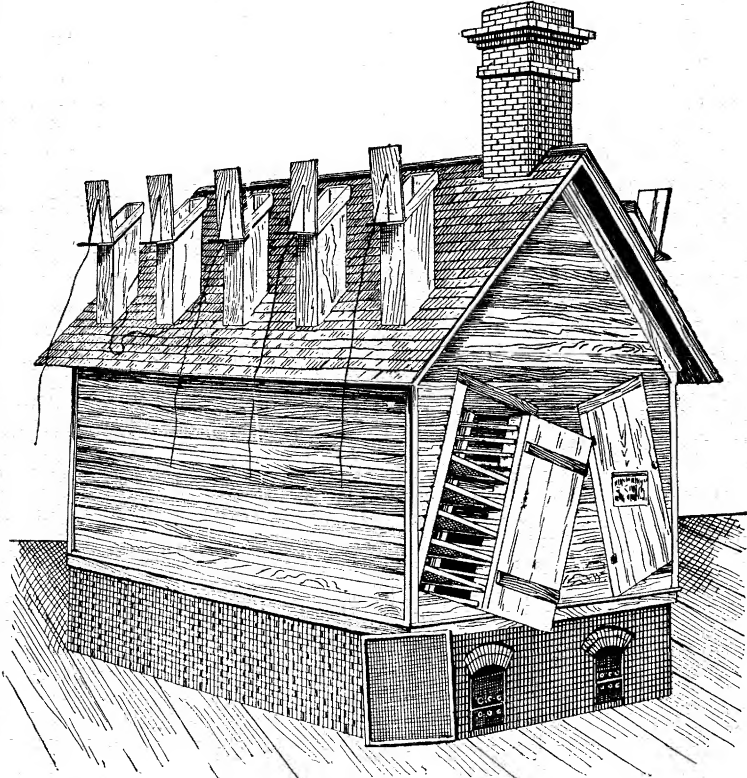


FIG. 3.—Improved patent prune evaporator.

in the bottom tiers and that, as it cures, it be raised gradually, one or two spaces at a time to the topmost tier, where it remains till finally cured. As the bottom trays are moved up their places are filled by fresh ones, and so the process goes on, involving endless labor. One or two steam-heated evaporators are doing excellent work, but their cost is yet too great for the average orchardist.

After the trays are removed from the evaporator the fruit is placed in bins, where, with occasional turnings, it is allowed to remain two or

three weeks or more. This is the sweating process. Fruit properly cured will have, on removal from the evaporator, a stiff, doughy, or leathery consistency, but with the present evaporators some fruit on each tray will, in spite of the utmost care, be either too much or too little cured. In the sweating bins this fruit all becomes homogeneous, the quality, so far as appearances go, becomes uniform, and the right consistency for market is obtained. Good fruit in the sweating bin will "crawl," when stirred; fruit dried too much will rattle; fruit dried too little will be soggy. When the sweating is completed, the fruit is taken out of the bins, passed over a grader like No. 7, graded to sizes, as 30s to 40s, 40s to 50s, and so on to 100s to 110s, or even a grade or two higher. These grades indicate the number of dried prunes to a pound. The price varies usually one-eighth cent per size. If 30s to 40s are selling for 8 cents, 40s to 50s would sell for $7\frac{7}{8}$ cents, and so on down the scale. The Italian will usually average four to five grades higher than the Petite, while the Silver will generally go a little over the Italian.

From this latter grading the fruit is packed in boxes of 25 to 50 pounds, or sacked in cheap cotton sacks holding 50 pounds each. Often the grower sells direct from the evaporator to the commission man, the latter doing the grading and packing at his own warehouse, the fruit being carried from the orchard in ordinary grain sacks.

In the matter of putting up prunes in fancy packages little has been done. Prices have been so good on the general crop that there has been little inducement to attempt fancy packing; however, with lower prices it is likely that something will be done by our more progressive growers in this direction.

A still more important step in the industry is the erection and efficient management of larger evaporating plants. There is at present such a wide range in the quality of our dried prunes that it is next to impossible to establish a definite grade or class for our fruit on the market, and in consequence we lose, on the whole, a large margin that always goes to "established brands." This we expect to overcome in the establishment and maintenance of large evaporating plants, from which the product would necessarily be much more uniform than at present.

With a decade of experience back of us, the promise of newer and better methods, and prospects for the future brighter than ever, we expect that in the next decade our prune product will be firmly established on the markets and we will then reap the reward due to merit,

NOTES ON PEACH CULTURE.

By J. H. HALE, *Connecticut.*

Although a native of a foreign country, nowhere on the face of the globe does the peach thrive so well as in the United States of America, and, with the exception of a portion of northern New England and a little of the central Northwest, peaches can be grown in every section of our great country. At present they are most largely grown commercially in western Georgia, New Jersey, Delaware, Maryland, Connecticut, western New York, western Michigan, southern Missouri, western Colorado, and California. No doubt there are many sections susceptible to the development of profitable peach culture on a large scale, but the right men to inaugurate and develop these possibilities in each particular section have not yet come to the front.

The rapid development of the business in southwest Georgia is a noted example of what can be done after a right start is made. Within a radius of 8 miles of Fort Valley, Ga., there are orchards aggregating over 1,000,000 trees, nearly all planted within the last five years, stimulated by the success of Mr. S. H. Rumph, originator of the Elberta peach. My own orchard of 100,000 trees is just outside the city limits, and was established in the winter of 1891-92 on an old cotton plantation that had been purchased a year before. After visiting every peach-growing section of the United States, I selected this as the one likely to prove most satisfactory and profitable. Here were cheap land and cheap labor, so far south that large late varieties could be ripened and put in market before the small, inferior varieties from the central sections, and yet not more than 1,000 miles away from 80 per cent of the consuming population of the country—Boston and Denver being about equally distant from this Georgia center.

Edgewood farm is situated on a broad, level plateau, of some 600 feet elevation. Before planting the orchard the land was surveyed in blocks 500 by 1,000 feet, with broad avenues running north and south, and cross streets east and west. Thrifty June-budded trees, straight whips 15 to 30 inches high, were planted, after being shortened to 12 or 15 inches; all the roots, except a few stubs 1 to 1½ inches in length, being cut away. The entire 100,000 trees were thus pruned. These trees

were quickly yet well planted in soft, mellow ground by simply pushing a straight-back Ames spade 6 or 8 inches down and pressing it forward a little to make room enough to insert the root-pruned tree at proper depth. Pulling out the spade and firming about the tree with the feet completed the operation of planting. The surveying, platting, checking off rows, pruning, and planting were all done at a cost of less than one-half cent per tree. Ninety-nine and one-half per cent of the trees started and made a fine growth, and now, at the end of three years, the orchard is a model of its kind.

After planting the trees, each had scattered about it one-half pound of cotton-seed meal and cotton-hull ashes, mixed half and half. This was turned under during March, when the whole orchard was plowed with modern steel plows to a depth several inches greater than was ever before known in that section, a subsoil plow being used in many cases.

Cotton, corn, and nursery stock were grown between the trees the first year, and in July every vacant spot was sown to cowpeas, and the past two seasons peas and soja beans have covered the entire orchard after midseason, no other fertilizer being applied except a very little in a few spots where growth was not quite up to the standard. Tree growth in that part of Georgia begins early in February, and ceases in September, so that pruning may be done at any time in November, December, or January, and is carried out on the same lines as in the Connecticut orchards, except that, as fruit buds are seldom killed in winter in that part of Georgia, it is always done before buds begin to swell in February.

The disease called "yellows" is not known, but spring frosts in March, after the fruit sets, are a serious drawback to success, and must always be counted on to come quite frequently; yet there have been but two total failures of the peach crop in this region for twenty years past.

The Elberta is a native of the section, and is undoubtedly the best market peach known there, and so the mistake has been made of planting too many of this variety and not enough of earlier and later kinds; so that in seasons of abundance the markets are likely to be taken by surprise with the luscious Elberta and not as able to handle all at as good prices as they would have been had earlier varieties been more plentiful, and thus paved the way for this delicious variety. Other sections of Georgia have also developed great orchards, and extensive plantings are also being made in southern Missouri and Colorado, but as yet none on quite as large scale as in Georgia.

Twenty or more years ago there was hardly an acre of commercial orchard in Connecticut, while now each year, from the middle of August to October, that State has not only her own supply of peaches, but thousands of baskets to send to less fortunate neighbors. Before embarking in the business of peach growing I thought I had learned at least two essential things: (1) That peaches required high, dry, rolling land,

with perfect frost and water drainage, and (2) that they must have thorough and frequent culture. Subsequent events proved these conclusions fully warranted, and developed other essentials to success. So at this time I feel that, while there is yet much to learn, we do understand the basic principles of successful peach culture in Connecticut. To my mind they are:

- (1) High, dry, sandy or sand-loam soil.
- (2) Careful selection of varieties most hardy in fruit bud.
- (3) Vigorous, healthy seedling stocks, budded from bearing trees of undoubted purity and health.
- (4) Trees given entire possession of the land from the start.
- (5) Thorough culture from the opening of spring till the first or middle of August.
- (6) Liberal annual manuring, broadcast, with commercial manures rich in potash and phosphoric acid and lacking in nitrogen.
- (7) Low heading and close annual pruning for the first five years.
- (8) Keep out most borers with some suitable wash and dig out all others.
- (9) Search for traces of yellows every week of the growing season, and at first sign pull up and burn every infested tree.
- (10) Thin the fruit so that there shall never be what is termed a full crop.

On these ten commandments hang most of the law and all the profits.

An orchard established on these lines in this latitude may confidently be depended upon to fruit nearly every year, there seldom being an entire failure of the crop; for, even though 90 per cent of the fruit buds be killed by extreme frosts of winter, the remaining 10 per cent will usually give a profitable crop. Indeed, following out these lines, I have not for eight years failed of having fruit each season; two crops very light indeed, three others when only a little thinning had to be done, and four when from one-half to four-fifths of all the fruit that "set" had to be picked off in its early stages to permit the rest to come to fullest maturity. One tract of 22 acres of sandy plains land, leased ten years ago for a term of fifteen years on a basis of 6 per cent on the owner's valuation, has given four crops, the net profits on which have been forty-two times the owner's valuation of the land and nearly sixty times its assessed value; that is, for a series of ten years, including the first three, taken to establish the orchard, the net profits from 22 acres of so-called "worn-out land" have been each year six times the assessed value of the land itself.

Our earliest plantings were a rod apart each way, and were so continued for some years. For the sake of experiment, in 1884, when planting the 22-acre orchard before referred to, 11 acres were planted 18 by 18 feet, and 11 acres 12 by 12 feet, 134 trees to the acre on one half, and 300 trees to the acre on the other. This very close planting

was only justified by the claim that peach orchards were short lived anyway, and that if full crops should be secured in the early years, the greatest profits would come from close planting, while for a long term of years the greater distance would be found most profitable. In the annual application of fertilizer they were fed so much per tree and not per acre. The first full crop was in the fifth year, and the close planted returned double the money of the other. There was no crop the sixth year and a light one the seventh, and no account was kept; the eighth year a large crop, and again nearly double money from planting closely. The ninth year a full crop was realized, and over 50 per cent more profit from thick than thin planting. This last year there has been nearly a full crop, with 25 per cent greater profit from the close half. For the whole term the 11 acres close planted is ahead over \$7,000 in net profits, and I do not think it possible in its declining years that the 18 by 18 tract can ever reduce this lead very materially, although I look to see the tide turn that way in future crops. With this close planting there was, of course, very close annual pruning.

Finding 12 by 12 so very profitable, but a little crowded for the best working of the land, we have in all plantings here the last four years put the trees 13 by 13 feet, 257 trees per acre; and also, in establishing an orchard of over 100,000 trees at Fort Valley, Ga., planted the same way, and at present see no reason to regret it.

Straight rows at equal distances apart are essential to best and most economical culture, and when the question of distance has been settled check off the rows in any way that will surely attain this result; holes should be dug as broad and as deep as actually required to contain the roots; in each of these scatter a big handful of very fine bone and two or three more over the mound of earth that has come out of it. This will become incorporated with the soil when filling in about the roots of the tree, which should be set a little deeper than it grew in the nursery row. With the feet firm the earth thoroughly about the roots, and when the orchard is planted, scatter about the trees, a foot or more away, a pound and a half of muriate of potash, or its equivalent in unleached hard-wood ashes. Trimmed to a single stem, the peach tree, as soon as growth begins, will push sprouts all the way along from the ground up. All of these should be rubbed off except three or four near the top, which should be reserved to form the main branches of the future tree. Some make the objection that a tree thus formed is likely to have forking branches that split down easily when full of fruit. I have not found it so. Still, the forking branches may be avoided by pruning the tree at planting up to, say, $2\frac{1}{2}$ feet, and here leave three side branches, shortened to 6 or 8 inches; another foot or so of clear main stem and then three or four side branches, shortened to 4 or 5 inches; then, by forcing most of the new growth to start from near the tops of these side branches, a tree may be formed without forking branches.

Occasionally, when crowded for room, we have planted some small hoed crop among the trees the first two years; yet the best culture can be given the trees only when they have the entire use of the land. We have found that the best of culture, at the least labor cost, may be had by alternately using Cutaway and Acme harrows at intervals of ten days or two weeks, and, two or three times during the season, working close up to the trees with a one-horse cultivator of most approved pattern. Seldom does it become necessary to use hand hoes of any kind. All culture should cease at least six weeks before the end of the growing season, or from August 1 to 15, in the northern and central sections of our country. As before stated, manures rich in potash and phosphoric acid and lacking nitrogen are best suited to the peach. This should not be taken to imply that nitrogen is not to be countenanced in the orchard. The danger from a too liberal use of nitrogen with the peach is that it is likely to stimulate a too rapid and too tender growth that will unfit the fruit buds to withstand the frosts of winter and the freezing and thawing of early spring. A fair proportion of nitrogen is, however, essential to the early growth and maturity of the young orchard. When bagged up in any of its commercial forms for farm use it costs all the way from 16 to 25 cents per pound, and yet it may be gathered from the atmosphere free of cost by some of the many leguminous plants that can be grown at a season of the year when the orchard land would otherwise be idle. I deem it a wise plan to sow the orchard at suitable season with some of these useful plants, to act not only as "nitrogen traps" through the growing season, but also to serve as a mulch during the dormant period.

A yearling orchard of 10 acres was sown last season with soja beans in drills 3 feet apart early in July. A one-horse cultivator used between the rows three or four times before the middle of August was enough to stimulate their best growth and at the same time keep the trees growing well. When frost came these beans were 3½ to 4 feet high, and a solid mass which, when packed down by snow, makes a grand mulch and will supply nitrogen and organic matter to be plowed under in early spring. Another orchard was treated to cowpeas in much the same way, while for several years past, in older orchards, we have by the middle of May each year turned under a rank growth of crimson clover that had been sown at the last orchard harrowing in the previous August. This on light sandy lands has not supplied more nitrogen than is required for the best tree development, but on stronger lands it is doubtful if it would be wise to continue the clover after the trees have reached a bearing age.

Overfed, overgrown, short-lived, one-crop trees in the nitrogenized family garden are constantly pointing out to us the fact that peach trees can not be grown in that way with any degree of success. Where green crops are in the orchard through the winter mice are apt to abound, and to guard against their depredations, and at the same time pro-

tect the young tree from the various climatic difficulties that beset it, I like to mound up a few shovelfuls of earth at its base at the approach of winter; the labor cost is but slight, the advantages many, and the earth easily tumbles away at first cultivation in spring. If the ground is inclined to be hard, or if clover or vetches have been grown, the annual culture should consist of one shallow plowing in spring and frequent surface cultivation all through the early part of each summer; while, if the ground is of a light, mellow nature, and no green crops are to be turned under, plowing may be dispensed with entirely, and thus the all too frequent, injudicious, and injurious, careless plowman's root-pruning may be avoided. By starting the Cutaway harrow right after frost dries out in spring, before the surface becomes dry and hard, the orchard can be thoroughly fitted for summer culture. Our best tilled and most healthy orchard has not had a plow in it for six years now, and probably never will have again. To make this plan a success harrowing must begin early.

As to manuring, after the first year all manures should be broadcasted. Lands in a good state of fertility, such as would be considered good corn or wheat lands, should have from 800 to 1,200 pounds of fine-ground bone and 300 pounds of muriate of potash or its equivalent per acre. Poorer lands should have proportionately more, up to a ton of bone and 600 to 800 pounds of potash. This should be kept up every year whether the trees fruit or not, which they will do sometime, and no man knoweth what year the peach crop cometh. In our own orchards we fertilize even more highly than here recommended, and find it exceedingly profitable. Size, beauty, and flavor can not be combined in the peach without the aid of potash and phosphoric acid.

Young trees started the first year, as I have indicated, being allowed to grow at will all the season, should have their three or four leading branches make a growth of from $2\frac{1}{2}$ to 4 feet each. Fall and early winter pruning have not been satisfactory with us, and therefore all pruning is delayed until late winter or early spring.

In the earlier days it was my custom, in trimming trees one year planted, to cut branches back to within a foot or 15 inches of the main stem; but as this tends to form a rather too close head for the foundation year, I now prefer to leave the first season's growth $2\frac{1}{2}$ to 3 feet long, and to reserve the severe shortening in for the second, third, and fourth years, particularly the second and third years. Besides the main branches to be cut away the first year, it will be necessary to cut off some lateral branches entirely and to shorten others somewhat. With the liberal culture and manuring recommended, each of the three or four main branches will, in the second year, throw out from their tips two or three leaders, each of which should make a growth of 3 to 4 feet. In the early spring following, pruning should begin, with the object of building a broad, low, open-headed tree. This is best accomplished by first thinning out all crowding inside branches and leaders and shorten-

ing in all others from one-half to three-fourths of the new year's growth, the closest cutting being in the central top. The third year's work should be on the same general plan, and it will often be found, unless the second year's work was exceedingly well done, that some of the third year's work ought to have been done the second, not enough thinning out having been accomplished. The object of the first three years' pruning should be to establish a well-formed tree best suited to forcing the greatest amount of fruit to the highest perfection at the least possible cost (Figs. 4 and 5).

After the right sort of tree has been established, and trees have reached a bearing age, pruning for a year or two more may be continued,

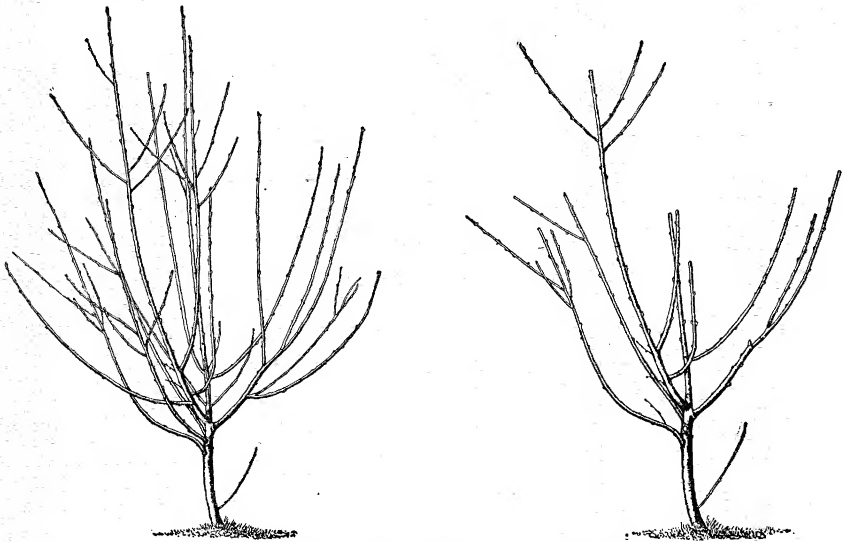


FIG. 4.—Peach tree 1 year old; before and after pruning.

partially on the line of a correct tree form, but more particularly as relating to fruit production. And so right here we have abandoned late winter and early spring pruning and do most of the work after the fruit buds begin to swell, so that we can judge on inspection which are alive and which are dead. In years when very few buds have survived the frosts of winter, pruning should be done with the object of retaining a great majority of the living buds, regardless of tree form, which can usually be somewhat righted the next year. Of course, in years when a good number of buds are found alive, pruning can be continued for form, but as the tree grows older, less and less pruning will be required.

The methods here described have in their early years given handsome, even-headed, well-rounded trees, which have been exceedingly profitable, although in later years they have become less shapely.

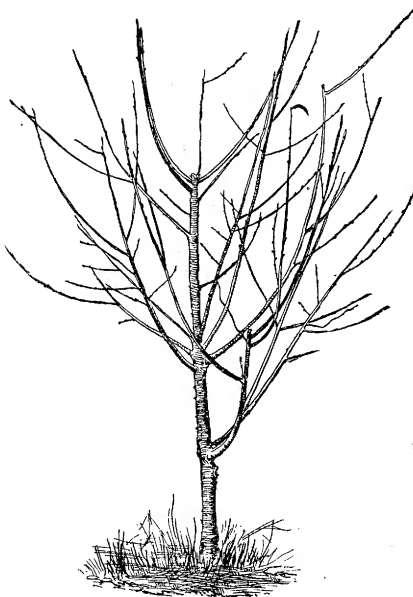
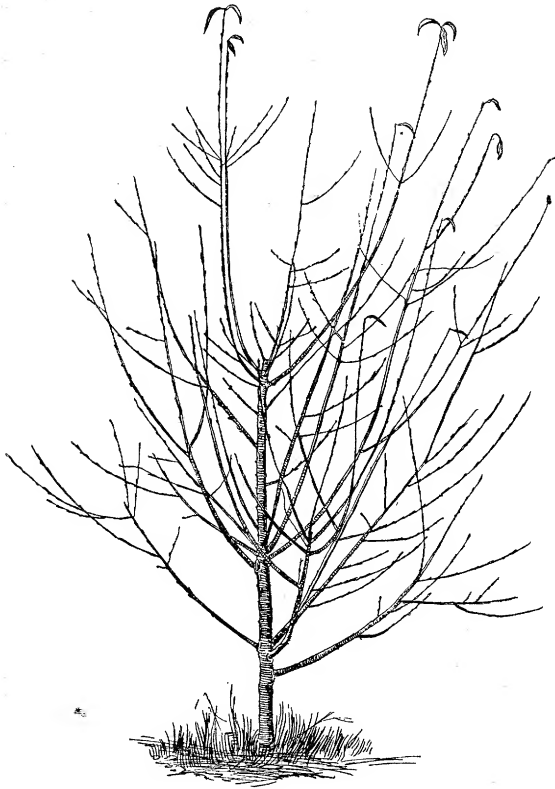


FIG. 5.—Peach tree 2 years old; before and after pruning.

As it is results, fruit results and dollar results, that count in commercial peach culture, we judge the method to be a decided success, at least for sections where winterkilling of fruit buds is the greatest drawback to success, and we shall follow it closely till some better plan presents itself.

Borers are always more or less troublesome, in every section, especially to young trees. I have found that a wash made of 10 pounds of potash and 1 quart of crude carbolic acid to each 50 gallons of water, with lime enough added to make it adhere during all the early part of the season, will keep the most of them out. This thick wash should be carefully applied all about the base of the tree and in crotches of the main branches early each May.

This should be followed up by an inspection of each tree in October and digging for borers whenever there is any trace of them. In the South, where cotton-hull ashes are abundant and cheap, we use these as our source of potash and also partly in place of lime. Once we have made the mistake of making the wash too strong of potash, and so have scalded the bark on some of the young trees.

A single tree or orchard established on the lines here laid down is almost certain to give some fruit nearly every year, and, in a majority of seasons, more than the trees can well sustain. There should be no "off year" with peaches, except when fruit or blossom buds are entirely killed by frosts; for right culture, proper feeding, and pruning should each year stimulate sufficient new growth to furnish far more fruit buds than are required for abundant crops. The right selection of location, soil, and variety will materially aid in overcoming climatic conditions, so that in frequent years we are confronted with the problem of what to do with the surplus fruit. Overbearing is the besetting sin of the peach tree; judicious pruning holds this in check somewhat, and in seasons of overabundance almost reckless pruning may be admissible, as the quickest way to dispose of much of the surplus fruit, after which hand picking of the green fruit will have to be resorted to. A well-grown 6-year-old tree will often set as many as 3,000 to 4,000 peaches, which, if reduced to 500 or 600, will give as many pounds or bushels as the greater number, be more beautiful in color, better in quality, and, if offered in market, sell for three or four times as much, while not affecting the vitality of the tree to nearly so great a degree as though the greater number had been allowed to mature. At first sight it looks like a big undertaking to pick by hand all the way from 2,000 to 3,000 peaches from each one of the thousands of trees in a commercial orchard. It is not half so difficult as it looks, and if it were, it must be done if finest fruit is to be expected. Thinning can not be done with safety till after the so-called "June drop," which usually takes place after the peaches are one-half inch or more in diameter. This drop and curculio stings should always be taken into consideration, so that we seldom begin to thin peaches until they are three-fourths of an inch

in diameter. We then pick by hand every peach that is stung or in any way diseased and disfigured, and put them into bags to be carted away and cremated, after which we continue and drop to the ground the great bulk of the crop, leaving on the trees the best specimens so far as possible, not less than 4 and usually 5 or 6 inches apart. Even with this treatment the maturing crops have often admonished us to thin more next time rather than less.

While harvesting last September I resolved that the rule for the future should be not more than 150 peaches to be left on any 3-year trees, 250 for 4-year trees, 400 for 5-year trees, and seldom more than 600 for trees of any size or age.

Six hundred peaches may make 1 bushel or 6. If the 600 are a part of the 5,000 or 6,000 that a full-sized tree often might attempt to mature, it is likely to be 1 bushel; while if the 600 be the selected few from the many that were rejected at the thinning-out time, it is more than likely to be 6 bushels instead of 1. And, judging from a money basis in our orchards for a series of years, the ratio is not less than 16 to 1, proving conclusively to my mind that thoroughly thinned peaches are fruits of gold.

Cultural notes on the peach would be incomplete without a word in relation to the yellows.¹ When we commenced here twenty years ago we were told that the yellows had driven the peach from our State many years before, and that our attempt at culture was foolhardy. My study of the disease of those early days showed me that, while it prevailed everywhere, some trees were more surely and quickly attacked and destroyed than others. Rank, thrifty, young trees of the lowlands and in the highly-fed home grounds suffered more than trees of like variety back on the hills, leading to the belief that at least one way to hold the disease in check was to surround the tree with those influences which tend toward a moderately healthy wood growth every season, and as even a temperature as possible throughout the winter and early spring.

These conditions are also essential to the best development and protection of fruit buds. Our selection of soil and location and our methods of culture and feeding have all tended that way. We were entirely free from this disease for the first eight years, in orchards of 6,000 trees, and now have a block of 16-year-old trees where never a trace of the disease has shown itself. After the eighth year the disease showed itself in the older orchards, and has since broken out in younger orchards of various ages, twice directly traceable to the nursery, as the disease developed the first year after planting.

At the first sign of the disease, trees are pulled up, root and branch, and burned. I do not doubt that the disease is contagious, and my personal experience convinces me that it is sure to spread to the adjoining

¹ For illustrated description of symptoms of yellows, see United States Department of Agriculture, Farmers' Bulletin No. 17, p. 7, by Erwin F. Smith.

trees nearest, so that on finding a single tree diseased with yellows in any young orchard, I destroy not only this but the four next adjoining. This treatment has several times entirely checked the spread of the disease at this point, while in other cases, where only the tree showing the disease had been destroyed, the surrounding ones manifested it the next year, and so each year a more rapidly widening circle spread, harder to hold in check.

Ten per cent of all the peach trees inspected by the Connecticut peach yellows commissioners in 1893 were found to have yellows. Our own orchards showed less than 1 per cent, and for the season of 1894 the ratio of percentages remain about the same in the State at large and in our orchards. Until, therefore, we know more about the yellows than we do now, we shall continue our work along the lines indicated.¹

The yellows is entirely unknown in the extreme South and on the Pacific Coast, which seems to me to be an indication that it is subject to climatic influences, while my own experience leads me to believe that it may be, in a considerable degree, held in check by right selection of soil, location, and proper feeding.

All careful growers and observers agree that on the first appearance of the disease the tree should be destroyed root and branch.

¹The statement that the disease is sure to spread to the adjoining trees nearest is contrary to the recorded observations of the special agent of the Division of Vegetable Pathology of this Department, Dr. Erwin F. Smith. A record of these observations will be found in Bulletin No. 4, Division of Vegetable Pathology, published in 1893. In one orchard, that of James W. Green, Magnolia, Del. (Series III, Pl. XXV), which was under observation during a period of six years (1887 to 1892, inclusive), the diseased trees were marked and recorded each year. As they were allowed to remain in the orchard, it may be assumed that the infection of other trees proceeded in the normal manner. An examination of the plat showing the recorded progress of the disease in this orchard reveals the fact that though it spread rapidly, resulting in the infection of over 95 per cent of the trees in the orchard within seven years after the first cases appeared, it did not spread in circles, nor were the trees adjacent to diseased ones more likely to show the symptoms the next year than those more distant. Had the cutting out of the four trees adjoining each diseased tree been practiced in this orchard, several hundred trees which actually remained healthy for two, three, or four years after their neighbors were diseased would have been unnecessarily sacrificed and their yield of fruit during that time would have been lost. It is evident that this would have resulted in a very serious shrinkage of orchard revenues, with no apparent compensatory benefits. This orchard is only one of many in which similar observations are recorded.

The systematic cutting out of diseased trees under the operation of the Connecticut yellows law began in 1893, and the number of trees condemned by the peach yellows commissioners in the State in that year included in many instances the accumulated cases of several years. In Mr. Hale's orchards trees had for several years been removed as soon as they showed symptoms of the disease. It is therefore quite probable that the comparatively small percentage of diseased trees in Mr. Hale's orchard in 1893 and 1894 was due not to the removal of the adjacent trees that showed no symptoms of the disease, but rather to the fact that the diseased trees had been removed in previous years as soon as discovered.

No one who hopes to make a success of peach culture can afford to let such a tree stand a single day after it is discovered.

The first symptom, especially on thrifty, vigorous, dark-green foliaged trees, is a thicker clustering of leaves on some one or more of the stronger branches. These leaves will often have a slight crinkly appearance and a shade of lighter yellowish green running through them, not seen in the rest of the foliage. This is a sign that will show in bearing trees one year, and often two years, before the fruit gives any sign, and on young nonbearing trees it precedes the "tip" growth on "water sprouts" or leading branches.

As to varieties, our earlier plantings were made with a view to covering the longest season with the best family and market varieties then to be procured, no intimation being given us that some were more hardy in fruit bud than others; and only by years of experience in the orchard here, and the close observation of many others, has it been clearly proven that there is a vast difference with varieties in this respect.

Of the older sorts, Alexander and Hill Chili are most hardy, but neither of them is very profitable. Next in hardiness we find Mountain Rose, Oldmixon, Stump, Fox (seedling), Ward Late, and Keyport, all fine table and market varieties, with white flesh. Yellow-fleshed varieties of the Crawford class are most tender. Now in later years we have the Crosby, Elberta, and Brigdon, all yellow peaches of extreme hardiness and great value. In New England the Crosby has not failed to fruit every year since first known, some fifteen years ago. All our northern plantings for the last five years have been entirely of Mountain Rose, Oldmixon, Stump, Crosby, and Elberta, and for two years past we have planted only the last two.

The greatest profits can only be secured through the most careful handling, honest packing, and prompt delivery of the fruit into the homes of consumers, in the most attractive package possible to secure, consistent with reasonable economy.

Our fruit is not picked until it reaches full maturity in size and color, this to be judged entirely by the color of the under or most shaded side of each peach, without handling it until after it has been decided to pluck it. Gathered at this stage, they should be in fair eating condition within twenty-four hours, in perfect condition in forty-eight hours, and yet, if rightly handled, most of them will keep nicely from three to five days, or even longer if paper wrapped.

After being plucked from the trees into shallow 12-quart picking baskets, the fruit is hauled to the packing shed in a low, broad-tired orchard spring wagon constructed expressly for that purpose. Arriving at the shed, the baskets are placed on an assorting table, where all sound, well-formed, right-colored peaches above $1\frac{1}{2}$ inches in diameter are graded into three sizes: "Extras," those $2\frac{3}{4}$ or more inches in diameter; "No. 1," $2\frac{1}{2}$ to $2\frac{3}{4}$ inches, and "seconds," $1\frac{1}{2}$ to $2\frac{1}{4}$ inches. As fast as

assorted, each of these grades is packed directly in the marketing baskets. Peaches a little off in color or form make two grades of "culls," large and small, and are sold without label or guaranty. "Softs" and "specks" are sold at the shed for local consumption, or to peddlers, and make the total of seven grades that each assorter is expected to make. The percentage of each, of course, will vary with season and variety, but to the 100 baskets they run with us about 37 baskets of "extras," 35 of "No. 1," 14 of "seconds," 5 of "large culls," 4 of "small culls," 3 of "softs," and 2 of "specks." The last three grades being practically the refuse of most orchards, they perhaps should not be counted, and so make a still better showing for the others; but as our good local markets make them worth 50 cents to \$1 per bushel at the shed, everything is worth saving here and is daily gathered from under the trees and brought to the packing shed. Now and then a few baskets of "specks" are unsold, but even such a small quantity is worth while looking after carefully every day of the season.

The peach business of to-day is of such vast importance, and responds so readily and bountifully to closest care and attention, that its highest possibilities can only be attained by earnest thought and attention every day in the year, and the greatest rewards will surely come to those who pay closest attention to every detail of the business.

